The Monthly Review of the AMERICAN ELECTROPLATERS' SOCIETY

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MAY 1941

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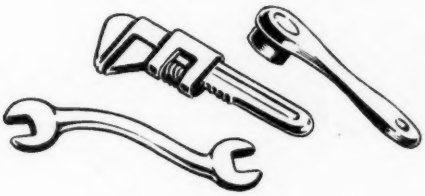

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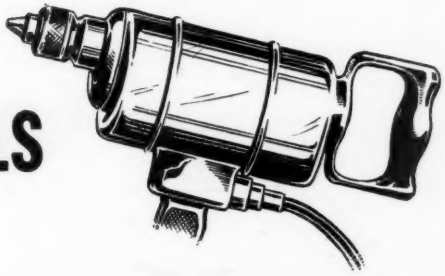

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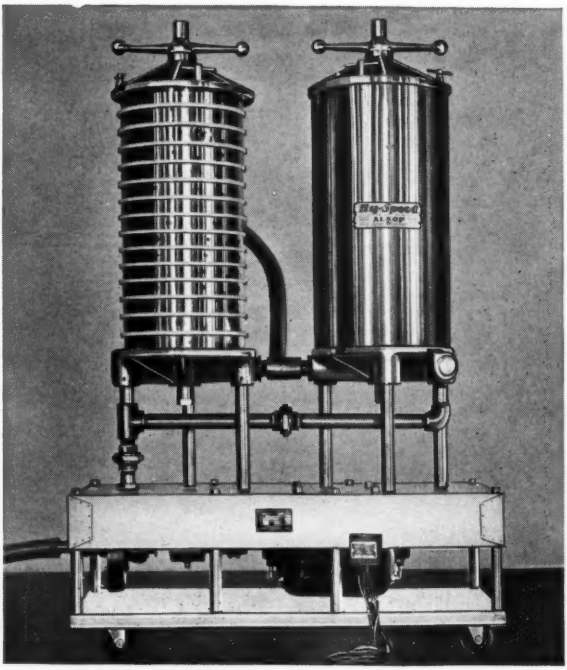

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The MONTHLY REVIEW

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VOL. XXVIII MAY 1941 NO. 5

The 29th Annual Convention of the A. E. S.

The Boston Convention Committee has been hard at work for many months planning for the 29th annual convention which will be held June 9-12 with the Statler Hotel as headquarters. Neither time nor money has been spared to make this year's meetings successful.

Those who plan to attend, both men and women, will be welcomed and entertained as never before. While the social side may have been stressed more fully than usual for advertising purposes, the educational features have not been neglected.

In this connection may we say to those interested only in the educational features presented on the program that they will find, in the many papers on polishing and electroplating, the information they desire, particularly when the subjects are thrown open to discussion. The authors of these papers are well known and are fully qualified to give up-to-the-minute advice on their respective subjects. All delegates and others present are invited to take part in these discussions, this being in many cases the most interesting part of the session.

Our only anxiety is that the defense measures thrust upon us by conditions in other parts of the world may hinder some from attending who otherwise would be with us. Unfortunate as this may be, we are thankful that as a nation we are not involved in war. And that like a lighthouse in a storm the American way still remains the only bright spot in a world gone mad with hate, horror and legalized murder.

We invite all who can possibly find the time to meet with us and enjoy the things provided by a committee whose sole desire is to make the Boston Convention the best one yet, and your stay in Boston one of the most pleasant experiences you have ever had. Keep the dates in mind and keep up with the latest developments in the metal finishing field.

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JOE BARRON
National Convention Chairman

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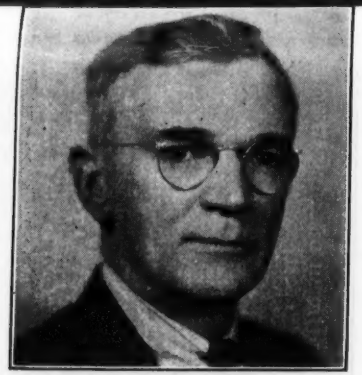

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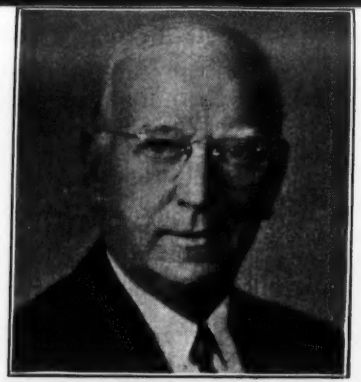

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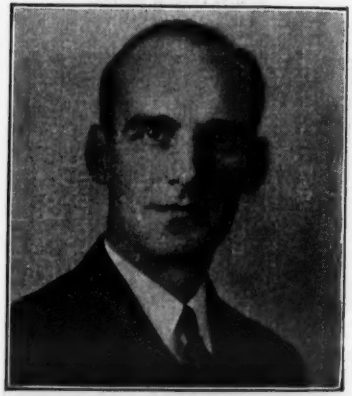

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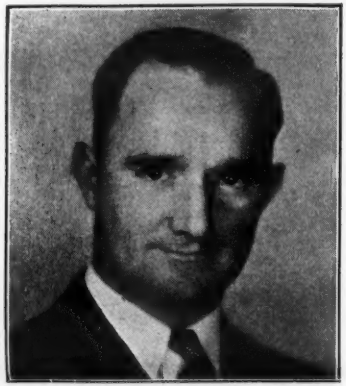


GEORGE LOESER

LOUIS A. GALE

ARTHUR MINTIE

National Defense *and the* Electroplating Industry

Read at Detroit Branch Meeting
March 7, 1941 by
R. M. WAGNER
Guide Lamp Division
General Motors Corporation
Anderson, Indiana

WITH the National Defense program occupying more and more of the spotlight in our manufacturing picture, it is logical that we should take a look at its effect on the electroplating industry.

Probably the first phase we should consider is the effect of the war and the defense program on the *materials* used in electroplating. It is a question now of, first, whether or not we can actually get the various products under discussion in unlimited—or adequate—quantities; second, even if we can get them, will the price make it necessary or advisable to discontinue their use in favor of a more economical process; and, third, *is there* any more economical product or process that is satisfactory? Naturally the metals draw our first consideration, so let us run down the list.

Zinc—At this writing zinc is, far and away, the common metal causing the greatest concern. In our industry it is of tremendous importance: as a basic constituent of brass, as the base for all die castings that are plated, and as anodes for zinc plating. The problem of zinc supply seems to be a grave one—and one which escaped everyone's notice too long. The defense program is consuming prodigious quantities of brass, mainly for cartridge cases, and zinc shortage is a quite normal result. At first the bottleneck was in refining. By now it is back to the smelter and very shortly it will be back to the mines. To open up new mines takes time and equipment; and what is to be done with the by-product acid that is produced? Sulphuric acid is already plentiful and unless this can be marketed, the cost of producing zinc is going to be almost prohibitive. And what about the price? In August 1939 the cost of electrolytic zinc anodes was about 7⅝ cents per lb. A year later it was 9¼ cents. Now it is up to 12½ cents per lb.—when you can get them; and die cast metal is in direct proportion.

What, then, is to be the effect on the electroplating industry? Unquestionably, there must be fewer die castings in the coming months, less usage of brass as a base metal, and in their place more steel stampings—and perhaps more plastics, though we shudder at that possibility. Another unhappy thought is the possible substitution of paint for zinc plating if anodes become scarcer, even though it is considerably more expensive. Some temporary relief from the refining problem is being had by platers who are now using a less pure grade anode than formerly. Of course this requires more bath purification, but it is one way out. Another only fairly satisfactory possibility is the use of zinc oxide to maintain the bath, and insoluble anodes.

Nickel—While the price of nickel seems to be effectively pegged, we are again confronted with the problem of supply. Matériel, machine tools, and structural and corrosion-resisting alloys have created a tremendous demand for this metal which is indispensable in modern warfare. The present shortage is largely our own fault for while many of us have been asleep, junk dealers apparently have been buying our scrap—and even new anodes—at prices above the market and selling it where it will bring the most—to agents of Japan and Germany. Too late some members of our industry discover that they have been inadvertently aiding the enemies of democracy.

At the present time there is a shortage of nickel anodes available to the trade. Whether this is due entirely to actual defense material demands, hoarding by apprehensive manufacturers, or a sort of disciplinary embargo by those who control the supply, remains to be seen. There is some hope that more will soon be available, but in any event, defense industries will have to be supplied first.

One obvious step toward a reduced nickel usage (and a probable simultaneous operating economy) is the use of heavy copper plates and correspondingly lighter nickel. The writer has conducted weather and service tests which indicate tentatively that .0008″ copper plus .0002″ nickel on steel and die castings gives as good protection as .0002″ copper and .0008″ nickel. Certainly, with modern methods of copper deposition and other advances which should shortly appear, this process would represent a decided ecomony, if it can be applied. Another source of considerable savings, on nickel and other metals, is improved insulation of

plating racks. The amount of metal lost on poorly insulated racks can amount to a sizable figure in a year's time.

Cadmium—This vagarious metal has always been the bad boy of the trade from a price angle. Its production is strictly dependent upon zinc production. Cadmium has, within the past four years, been both a drug on the market at 55 cents per pound and practically museum material at $1.80. Usage of one large customer can—and has—produced this wide variation almost overnight. At present it is more or less available at 90 cents but is cordially damned by most platers because of past experiences—and because it is not economical at any price which has been quoted to date.

Nevertheless it has advantages for certain well-known applications and is specified on many defense items which may be subject to marine exposure. This ordnance usage alone will probably take all our cadmium supply.

Copper—Probably this is the original electroplating material and, until comparatively recently, the one least studied. Thus far copper has remained relatively steady and no immediate shortage is anticipated, though its usage is bound to increase tremendously.

Here, then, appears to be the electroplating field which must be expanded. Developments in recent years have made possible the rapid and efficient deposition of copper from cyanide solutions. Whether or not this is 100% practical *on steel* remains to be seen. For years, heavy deposits from acid baths have been common but limited in application due to hardness and roughness usually attendant. It is our understanding that considerable work is now being carried on to produce acid copper deposits having more desirable characteristics than those from old type baths. This is desirable from the angle of cost and of ready availability of bath materials.

Cyanides—At present these are essential to most of our copper, zinc, and cadmium plating. Until recent months, a large percent of the cyanides used in electroplating have been imported. While domestic manufacturers have produced a high grade sodium cyanide, their output has naturally been limited to the demand for American-made material. Now, with foreign sources closed, American manufacturers are temporarily taxed to supply all the demand. They are expanding their facilities but it is an

obvious economic point that they cannot afford to increase their production to the entire extent of the foreign market if they must anticipate competition from cheap foreign labor after the war. This would leave them holding the proverbial sack with idle manufacturing equipment (as many other industries will be) and would contribute more toward the inevitable post-war depression.

When we consider the ultimate end of cyanides in plating, it is rather embarrassing. Annually we use hundreds of tons—and every ounce eventually goes down the sewer. It comprises no part of the finished product. It is either dragged out mechanically (along with considerable metal, incidentally) or oxidized to carbonates in inefficient plating baths. These latter are then laboriously removed by one of a half-dozen unsatisfactory methods, and discarded.

Here is a challenge to our industry—to make renewed war on dragout losses and inefficient plating baths. This is far from a new subject but, like safety, it is one that seems to need constant repetition. And in the present critical period the very continuance of our business may depend on it.

Always a believer in dragout recovery, we had a recent example of absolute neglect of an important dragout loss under our very nose. Two large, high-concentration, high temperature cyanide copper baths were operating side by side in full automatic conveyors, on identical parts. One conveyor included a recovery tank following the copper, while the other, an older converted machine, did not have room for this step without making expensive mechanical changes. Both baths were equipped with solenoid operated sprays to rinse solution back into the tank as racks emerged. The first bath required very little replenishing, while the second used abnormal quantities of copper and sodium cyanides and other constituents. This went on for months before we actually got around to checking the amount of material we were saving in the dragout tank—and realized that the mechanical changes in the second conveyor would have been paid for by now in material we would have saved. We are now preparing to lock the door—after only *part* of the horses have been stolen.

Formerly it was nobody's business if a concern chose to operate inefficiently, but now it is a patriotic duty—and a duty to the

plating industry *as well as* the individual to take advantage of every material saving possible.

Tartrates—Another constituent of many cyanide copper baths is Rochelle salts. Some platers add this direct while others use tartaric acid to destroy carbonates and keep up the tartrate concentration at the same time. Both these materials which are by-products of the wine industry, and largely imported from Spain, France and Portugal, have become increasingly scarce; and at the same time the price has gone up by leaps and bounds. It is not unlikely that tartrates will shortly not be available at all—and at any rate their use is not economical at present prices.

We must find a satisfactory substitute. Citrates have been used in this connection with reasonable success and they are readily available from domestic sources. It is also our understanding that another chemical is perhaps even more satisfactory than Rochelle salts, but this has not been officially announced as yet by those who have developed its use.

Chromium—No discussion of plating materials would be complete without at least mentioning chromium. While no shortage of chromic acid has yet developed, we will probably have to consider this material very soon since its source is principally foreign. Low grade chromite deposits exist in Wyoming, Oregon, and California, but these can be worked profitably only if higher quality foreign ore is not available. During peace time, practically all chromite is imported, the sources being as follows: Africa 37%, Philippine Islands 24%, Turkey and Greece 14%, Cuba 11%, French Oceania 8%, and others 6%. While all these sources are not closed, most of them are in some jeopardy, and as during the first World War, research is now being directed toward making the best possible product from low grade domestic ores. Of course *our* savings along this line can be made only through dragout recovery.

Some additional chrome plating requirements have shown up in the tremendous increase of hard chrome plating of dies—particularly for defense material, but equally applicable for most industrial dies. The use of hard chrome plating on the interior of large gun tubes to reduce wear is also of current importance. However, 75% of all chromite used in the United States goes to the steel industry for use in alloys and for refractory linings in furnaces.

Tin—This metal is still available from British colonial sources—at least for the present. Its price has not risen appreciably. While its protective value is not as great as that of zinc, it can be deposited with a pleasing appearance and it may be a satisfactory substitute in many cases where only mild exposure is involved, if zinc continues to be hard to get.

If, then, we summarize the conclusions of this discussion thus far we will see that to meet the present emergency—that is, to stave off the threat of plating material shortages and the substitution of paint or synthetic finishes, or plastics—we must probably do the following things:

1. Operate with maximum efficiency and economy of materials, by reducing losses due to inefficient baths and heavy mechanical dragout, and by keeping all rack coatings in good condition. This will save on all metals, salts, and cyanides.
2. Substitute plated steel stampings for plated die castings and brass. This will save a large amount of zinc for use in defense purposes.
3. In this latter step, increase the thickness of copper deposits so that nickel thickness may be decreased to a minimum, thereby releasing nickel for the alloys necessary to defense—and incidentally effecting a very substantial saving for ourselves. Along this line quantitive data is almost wholly lacking, which would serve to prove exactly *what* is the minimum allowable nickel thickness if the total thickness is maintained by using additional copper.

It is more or less reasonable to assume that we should not go below the .0002″ of nickel specified for brass. However, even this is not absolutely certain since the copper deposit contains no zinc and we have no proof that even thinner nickel deposits would crack or fail—if they were plated over *copper*. Furthermore, there is reason to believe that the more efficient and rapid processes evolved for copper plating in recent years produce a more dense deposit due to their smoothness and the absence of gas evolution. This should increase their protective value. Also, copper-buffing is in the picture, and this should improve corrosion resistance by minimizing porosity. Here is a field that is wide open for investigation—but it should be started quickly. It should have been done long ago.

While we cannot properly assume that copper can be im-

mediately substituted for too much of our customary nickel coating, we can at least work toward the maximum proportion of it allowed under existing specifications. For example, we find that current A.E.S. and A.S.T.M. specifications (which seem to be perennially "tentative") provide that approximately 50 percent of the total deposit shall be nickel. In the case of "Type F.S.," the highest grade regularly specified, we find that "The minimum thickness of the nickel coating or of combined layers shall be .00125 in. and if copper is used, the minimum thickness of the final nickel layer shall be 0.0006 in."

While some progressive plating concerns are taking full advantage of this, all too many of us have clung to the older methods of depositing .0001″ to .0002″ of copper and the remainder nickel. Many, in fact, still use a negligible copper strike or no copper at all. The reason is obviously due to the lack of dependability of the old cyanide and Rochelle salt baths in depositing heavier coatings. Now, if we are able to operate a cyanide bath, whose dragout cost per gallon is practically the same as that of a bright nickel bath, at 100% efficiency, we can make a saving which is equal to the difference in cost between copper and nickel. In most cases, from 20% to 50% of the nickel deposited can be replaced by copper at a price differential of about 28 cents per pound. This is a really substantial saving. If an acid bath can be used, even more savings can be made because of lower cost of dragout, but of course, the current cost will be doubled—if this is significant.

When we start out actually to use heavy copper plates we run into several difficulties. If we plate rapidly on a rough-polished surface, we are likely to encounter roughness which apparently can only be overcome by better polishing or *no* polishing. And then when we start bending a steel part plated with heavy copper, nickel and chromium, which has apparently been satisfactory to date, we may find the plate peeling off. This gives us some pause, for while most of us could produce an adherent plate on a given steel part, some of the methods employed might not be entirely applicable to automatic plating on a high production basis. We are thinking, for example, of the time-honored dip involving nitric acid and salt. Platers today are not as hardy as they were twenty years ago—and even though a good exhaust system were provided we can picture the shop

committeeman having a nervous breakdown when one of the brothers gets his first whiff of chlorine. And, too, nitric acid is not too easy to hold in tanks.

Methods of cleaning and preparing steel for plating vary widely over the industry, but have several points in common. Precleaning is in quite general use, though specific methods vary. Many platers still use degreasing with various combinations of vapor and liquid phases. The trend seems to be away from this however, due to excessive cost of materials, evaporation losses, and to the fact that solids are not removed and must be wiped or brushed off later, involving extra labor which is becoming more expensive daily.

The perfect substitute for degreasing has yet to be found, but spray cleaning is daily finding more favor, especially on steel. Expanding research by cleaner purveyors in recent years has produced a number of materials applicable to use in spray washers. These consist of emulsions, new organic solvents, and new alkaline combinations which, when used in a well-designed spray washer, produce results at least as good as degreasing, at a lower cost, and with the additional advantage of removal of solids. Kerosene, or oleum spirits, is being used considerably in soaks and sprays, though it does provide a fire hazard and is difficult to remove. Spray manufacturers have produced improved spray heads, but considerable remains to be done toward making a nozzle that will provide maximum impact on the work with minimum atomization, and still be non-clogging. Also for some reason it seems to be easier and often less expensive to get brass sprays than steel ones, which are more desirable for alkaline solutions. In washers, we definitely favor the type where racked work is passed through solution sprayed from the sides. This permits greater impact since the force is not broken up by a screen through which the solution must pass. The "submerged spray," a soak cleaner in which nozzles produce a vigorous scrubbing action, is also being used with success. However, in any automatic cleaning cycle handling large production, any soak of long enough duration usually involves too large a volume of solution to be economical.

Electrolytic cleaning generally comes next in the cycle, and in this operation there is considerable variance of opinion. Cleaner manufacturers have done much here in developing new

and better balanced compounds, though platers have probably taken less advantage of them on steel than on brass and die castings. However, it has come to be appreciated that alkalinity is not the only factor to be considered in steel cleaners. Reverse-current cleaning has increased markedly in favor and is now almost universally used, either in combination with direct current cleaning or exclusively. Its value with certain cleaning compounds in removal of carbon smut has come to be generally recognized. In fact, the reverse current seems to be more important than the cleaning compound. When used for this purpose, the reverse cleaner is frequently applied *after* the acid pickle which is still a part of most cleaning cycles. On mild steel, it usually comes before the acid, though we personally like to see it *after*.

Ever since the excellent work presented at the 1940 Dayton convention by Zapffe and Faust on hydrogen absorption in steel, there has been a trend away from strong acid pickling—and even from cathodic cleaning, in the plating cycle. However, while we share the almost universal feeling that this *should be* a proper step, we have been unable to prove it in practice—nor have we seen any practical proof from anyone else of the fact that acid pickling or direct current cleaning, as generally used, actually makes plating peel. We do know that good adherent plating is being produced on steel by use of reverse cleaning alone, without an acid dip; and we also know that equally good adherence is obtained where direct current cleaning and pickling, with or without a reverse cleaner, is used. Unfortunately, we also know that non-adherent deposits may be obtained from all these cycles even when conditions of current, temperature, and concentration seem to be correct.

The acid dip, when used, is usually sulphuric or hydrochloric, or occasionally citric and when there is scale that is not entirely removed in polishing it is frequently necessary to use current if the time in the dip is short. Cathodic current naturally reduces the oxides more rapidly, although this is again even more conducive to hydrogen evolution on the steel. Etching, however, is minimized with cathodic current. Wetting agents are also sometimes used in the acid—particularly if the acid has to serve as a supplementary cleaner.

Where acid copper, or highly efficient cyanide copper is used, a cyanide copper strike is necessary. In the latter case the

additional cleaning action provided seems to be an important function—which is a reflection on the efficiency of the cleaning cycle. Frequently, troubles in plating on steel can be traced to the copper strike. Roughness of the finished deposit has been blamed on this seemingly innocuous bath—and it is usually the best cyanide consumer in the plant. We know of one recent instance where a baffling problem of non-adherence was definitely traced to the strike—a 15-second treatment in this case.

For the greatest economy, both of labor and materials, it is probably desirable to buff the copper. If parts are free from deep die marks and other blemishes, this process can be used to reduce or completely eliminate polishing. If polishing is necessary, here is the easiest way to cover up emery marks—and if metal is to be removed in buffing, it is certainly better to remove copper than nickel, both from the standpoint of economy and conservation of the nickel supply. This being the case then, a heavy copper plate (.001″ to .002″ usually) should be applied, and buffed to a suitable finish.

The cleaning of copper for subsequent plating has also undergone some revision. A few years ago the use of a reverse cleaner on copper would have been considered at least an oddity if not an error. In recent years, however, largely due to the development of new cleaning compounds and cleaning theories, this has become practically standard practice. The reverse cleaner is used alone or following a cathodic cleaner, which is sometimes preceded by a spray cleaner if there is considerable compound to be removed. The even tarnish produced by a good anodic cleaner is readily removed in a mild acid dip and an active surface is presented for the copper or nickel plate which is to follow. Whether or not a second copper is used depends on the amount removed in copper buffing and the size and frequency of cut-through areas. If either is great, it is certainly desirable to copperplate a second time, and avoid the necessity of making up the required thickness with extra nickel.

It is rather standard practice to finish the nickel and chrome plating without further buffing—and without re-racking wherever possible. This, of course, saves considerable labor but requires thorough rinsing and neutralizing of racks. Here, also, rack coatings must be kept in the best possible condition to avoid carry-over of solution.

In this discussion we have made no effort to present anything original but have tried to analyze the requirements imposed on the plating industry by the war and the defense program, and to note the trends in methods now being used to meet those requirements. Obviously, plating on steel is far from perfect, and our present specifications are not clearly worked out, particularly concerning relative copper and nickel thicknesses. Furthermore, a standardized test for adherence would be a great help in determining the quality of our work. We feel that the A.E.S. and its members can perform a major service by attacking these problems with organized research—*immediately*.

In conclusion, therefore, it is the writer's opinion that, whether we like it or not, we will have to plate more steel and less brass and die castings in the coming year; that we must use methods which will produce the greatest economy of metals vital to the defense program and materials which the war has rendered less available to us; and finally, that the A.E.S., as a body, as well as its individual members, should concentrate research efforts on the plating of steel, determining how far we can safely go in substituting copper for nickel on steel, setting up some sort of standard test for adherence of deposits, and developing an accelerated corrosion test that means something.

"There is no virtue like necessity"—and somehow we cannot help feeling that out of this forced transition will come an equally satisfactory plating process, which will be so economical that we may never return to brass as a base metal and heavy nickel over light copper; even when armaments and priorities and sellers markets are forgotten.

WHICH ARE YOU?

Are you an active member, the kind that would be missed,
Or are you just content that your name is on the list?
Do you attend the meetings and mingle with the flock,
Or do you stay at home and criticize and knock?
Do you take an active part to help the work along
Or are you satisfied to be the kind that "just belong"?
Do you ever go to visit a member who is sick,
Or leave the work to just a few and then talk about the clique?
There's quite a program scheduled that I'm sure you've heard about,
And we'll appreciate it if you too, will come and help us out.
So come to the meetings often and help with hand and heart,
Don't be just a member, but take an active part.
Think this over, member, you know right from wrong
Are you an active member, or do you just belong?

(Reprinted from a folder, sent to us by Horace H. Smith of Newark — Ed.)

Rubber—*Its* Application *to* Electroplating

By O. S. TRUE
Manager,
Tank Lining and Roll Covering Sales
Mechanical Goods Division
UNITED STATES RUBBER CO.

RUBBER is a natural product, indigenous to Brazil, but for commercial purposes largely transplanted to Sumatra and the Dutch East Indies. Rubber is contained in latex, found in the thin layer of cells in the bark of many trees, but the rubber of commerce is obtained from the Hevea Brasiliensis tree. As it comes from the tree, the latex contains about 35%-40% rubber, the balance being water, salts and protein. This yield has been attained by careful cultivation and the development of scientific tapping methods. Botanical studies have been of great value to the rubber industry.

After it is gathered, the latex is made alkaline with ammonia as a precaution against premature coagulation. Coagulation is accomplished by adding acetic or formic acid. Subsequent washing, drying, sheeting and, in some cases, smoking, complete the preparation for market. Plantation and laboratory experiments have made available a product of uniform quality and analysis. You can readily appreciate that uniformity of raw material is of vital importance in subsequent manufacture. Most rubber is shipped in coagulated form, although development of various processes requiring liquid latex has resulted in a considerable increase in latex imports.

Even the highest quality crude rubber is of little commercial value unless suitably compounded. Crude rubber is tough and requires a special heavy equipment for processing. It is thermoplastic and subject to cold flow, and at best usable only at ordinary atmospheric temperatures. The addition of sulphur and heat as discovered by Charles Goodyear (the fundamental discovery of vulcanization) eliminated the cold flow and opened a wide field for commercial exploitation. Other important improvements have been the development of organic accelerators

and anti-oxidants, resulting in reduction of sulphur requirements and consequent longer life. Certain plasticizers have been discovered which improve the physical properties of stocks, particularly of hard rubber, without sacrifice and sometimes with improvement of its other properties. The incorporation of certain inert fillers in rubber, particularly carbon black, has resulted in a tremendous increase in quality and has greatly broadened the scope of successful application of rubber to industrial problems.

Rubber has the capacity to hold in uniform dispersion very considerable amounts of finely divided materials. It is also possible to vary the coefficient of vulcanization or hardness by varying the amount of sulphur. It, therefore, becomes apparent that an infinite number or variety of compounds is available to the rubber chemist. The problem is to prepare the compound best adapted to the purpose at hand. For instance, for a tire tread a high tensile and a high degree of resistance to abrasion are requisite; for a vibration dampener a high degree of resistance to internal fatigue or a low hysterisis loss; for electrical insulation a high dielectric; for protection against corrosion a high degree of impermeability to gases and liquids. The best stock for one purpose might be absolutely inadequate for a different purpose. Many people are prone to judge a stock by its initial tensile strength. This is often erroneous, as many vital properties are built in at the expense of tensile. Percentage loss of tensile is important as it shows the degree of aging, but initial tensile may easily be over-emphasized.

With particular regard to the suitability of rubber for electrochemical or plating service it can be said that this industry has presented to the rubber manufacturer some of his most difficult problems. A suitable rubber must be resistant to corrosion, temperature, electrical leakage, and diffusion of liquids or vapors. In addition, the rubber must not contain any ingredients which in any way interfere with the functioning of the bath or interfere with the proper deposition of the plate.

As a general statement it can be said that rubber compounds have been developed which will meet these conditions. From the point of view of corrosion, rubber will stand up under the alkaline and acid solutions commonly used with the possible ex-

ception of chrome; temperatures up to 180°-200°F. can be withstood satisfactorily; insulation against voltages considerably higher than used in plating work has been accomplished and a high degree of permanent resistance to diffusion obtained.

As most of the difficulties have been encountered and solved in the field of rubber tank linings it may not be amiss to consider some of these problems from the rubber lining point of view.

Soft rubber linings may serve perfectly satisfactorily for two or three years, then fail due to water blisters or plating through. A water blister is a collection of water between rubber and metal. This water is usually neutral pH6-7. Strangely enough the water comes from a much more acid solution, namely the plating solution itself. This phenomenon has not been satisfactorily explained, but it appears to be a phenomenon of electro-osmosis. Plating through may occur in any rubber lined tank. It may be the result of porosity, or due to the rubber compound becoming saturated with electrolyte from the plating bath. Plating through may occur without porosity—through a membrane impervious to the high potential ultraviolet ray.

Improper adhesion to the metal wall was frequently encountered in the early days of rubber linings due to inadequate rubber-to-metal adhesives. Rubber-to-metal adhesives developed during the past several years have made this type of difficulty exceedingly rare.

In the case of hard rubber linings, especially on large steel tanks, some difficulty has been encountered due to cracking. This is caused by the fact that hard rubber has a high coefficient of expansion, approximately five to seven times that of steel. Hence if there is a sudden chilling of a hard rubber lining, as may result from washing the tank while warm with very cold water, the lining may crack.

Contamination has been troublesome, particularly in bright nickel baths, resulting in poisoning of the bath and defective plating, poor adhesion and discoloration. Contamination has been the most difficult problem to understand in connection with the use of rubber linings in plating baths.

Premature aging, notably with copper baths, is presumably caused by small amounts of copper dissolved in the rubber which act as an auto-catalyst causing excessive oxidation and premature failure.

Rubber chemists have found ways and means of overcoming the above difficulties. The problems have not been easy. The application of rubber to plating requirements has justly earned its position as one of the most difficult of rubber problems.

As water blister must be due to the passage of liquid through the rubber, this condition can be corrected by providing a less permeable membrane. This has been accomplished by increasing the coefficient of vulcanization, i.e. increasing the hardness and eliminating water soluble materials from the compound. Rubber, like any other organic material, is not absolutely impermeable to water vapor, but the science of compounding rubber has advanced and water absorption has been reduced to such a point that practical satisfaction is now obtained over a period of years.

With regard to plating through, this phenomenon can be prevented by use of purified rubber, by elimination (in so far as is possible) of water solubles, control of content of carbon black, and by increasing the hardness of the stock. To permit plating through to occur, the membrane itself must become a conductor, and this conductivity must be caused by absorption of the solution into the membrane, assuming no porosity to be present. This is demonstrated by the fact that a varying time period is always necessary before plating through occurs, and a section of lining which has given trouble due to plating through may subsequently be resistant to high potential if properly dried out before test. There have, of course, been cases where plating through has occurred almost immediately but this condition has undoubtedly been due to porosity in the rubber. The tendency to plate through would of course be aggravated if conditions were such as to induce a negative charge on the metal tank.

Poor adhesion has been corrected by experience and extensive research in the field of rubber-to-metal adhesion. The early adhesives were thermoplastic and non-uniform. Present day rubber adhesives contain curing agents, are less thermoplastic and are obtainable with excellent uniformity. Certain other types of adhesives, with resin bases, harden due to polymerization and give excellent results. Uniform adhesion giving a bond stronger than the rubber itself is now good common practice.

Cracking of hard rubbers is purely a physical condition.

Danger of cracking may be reduced by inserting a relatively soft compound between the face stock and the metal such as is common practice and by the introduction of certain hard rubber plasticizers which render the hard rubber more elastic without serious reduction of the chemical or electrical efficiency. Considerable study has been given to the subject of hard rubber plasticizers with the result that compounds are now available with sufficient elasticity to permit direct application of face stock to metal without benefit of intermediate soft rubber. The perfect answer is to protect the tank against sudden thermal shock and this can usually be done if the properties of the material are properly understood.

Contamination of silver plating or other plating baths may be caused by a black sulphur compound caused by the unreacted elemental sulphur in the rubber compound. This may be corrected by treating the rubber lining with caustic soda so as to remove the free sulphur. A ten percent solution at 180-200° F. for a period of two to three hours is usually sufficient. Some platers make a practice of treating all new rubber lined tanks with hot dilute acid or alkali solution before placing such tank in service.

The contamination of bright nickel baths is a much more complicated problem. It is known that traces of many organic compounds added to a nickel bath will materially affect the character of the deposit. In constructing linings for bright nickel tanks such materials must be avoided. The trouble is that the rubber manufacturer does not always know whether a given organic accelerator or anti-oxidant will adversely affect the deposit. The only thing which can be done is to submit cured rubber samples of the proposed compound to the plater who plans to use the lining. Laboratory tests will eliminate those rubber compounds which will cause contamination of the bath. Usually the laboratory test is considerably more severe than the actual service requirement, so that a perfectly satisfactory lining material may be rejected as a result of this test, but the stocks that pass are certain to give satisfactory results under actual service conditions.

As a result of cooperative work between plater and rubber manufacturer suitable rubber stocks have been found for all of the standard bright nickel baths. If one plans to use special

materials or variations of standard practice, preliminary rubber tests are especially recommended. It should be borne in mind that problems involving contamination have been solved by cut and dried methods rather than by application of scientific deduction.

Soft rubber linings will absorb a small amount of copper from a sulphuric acid solution of copper sulphate. Apparently the copper, after it enters the rubber, combines with the resin acids of the rubber, forming a rubber soluble copper compound. Such compounds greatly accelerate the oxidation of rubber, especially at the solution line, causing loss of tensile strength and decreased resistance to water absorption. One means of improving this condition is to use a purified rubber very low in resin acid. Also, different accelerators will act differently with respect to copper. For example, certain sulphydril accelerators are much better than quanidines. A further improvement may be made by the use of special anti-oxidants which render the copper absorbed insoluble in rubber and hence cause no acceleration in the rate of uptake of oxygen. Unless an abrasion condition is present it is better to use a hard rubber lining for an aqueous solution of copper salt. Hard rubber will not absorb the copper as readily as soft rubber, and even if it did, the copper so absorbed would not appreciably alter the oxidation rate of the hard rubber. Hard rubber linings may be successfully used for copper, bronze, or brass plating solutions.

Assuming absence of contaminating anti-oxidants and accelerators, adequate resistance to corrosion, and the requisite physical properties, the rubber compound best adapted to plating requirements is the compound having least absorption. Absorption can be best determined by suspending thin strips in solution at elevated temperature, and upon completion of test measuring increase in weight and volume. If comparative tests are to be made it is important that samples of identical thickness be used and if areas are not identical the absorption per square inch should be compared.

With the development of rubber compounds suitable for plating requirements the use of rubber in the plating industry has very considerably increased. Rubber lined tanks have been successfully used for the acid plating solutions, also for pre-plating pickle and wash tanks and for caustic tanks when particular protection

against pick-up of ferric iron is desired. Pumps with conventional lining and covering, or rubberized by a spraying or dipping method, have been supplied. Molded hard rubber pumps of good operating characteristics are available. Ventilating systems—hoods, ducts, and fans—have been protected against corrosion with rubber.

Whenever steel hoods and ducts are furnished for rubber lining it is important to specify adequate gauge of metal and to provide adequate stiffeners. Metal must be adequate to withstand sand or shot blast cleaning without permanent distortion. Furthermore, duct work should be made so as to allow for assembly without undue strain, as hard rubber linings may crack if metal parts are forced into position.

Tumbling barrels have been rubber lined to obtain the benefits of the abrasion resistance of this material. Dipping baskets, either of solid hard rubber or rubber covered metal, are in constant use. Plating racks have long been protected with rubber. Pipe and fittings, either solid hard rubber or rubber lined, are used for distribution of corrosive solutions. Rubber covered guide rolls are used in connection with the continuous plating of wire and strip. Rubber lined acid storage and distribution systems are common practice. Molded rubber or rubber covered filter press plates and frames are available. Rubber hose, packings, insulated wire and cable, etc., are in such common use as to merit no special comment.

Rubber equipment offers many advantages to the plater: cleanliness and freedom from leakage; freedom from contamination of product; freedom from stray current losses; freedom from corrosion; flexibility of design—particularly in the case of all rubber covered materials, where the full design range of the metal can usually be employed; simplicity of repair in case of accidental damage; and permanence, or economic life.

Much that has been accomplished in the development of rubber for plating requirements has been made possible by the cooperation of the platers and the manufacturers of plating equipment, and their assistance is gratefully acknowledged. The writer also wishes to acknowledge his indebtedness to Dr. H. H. Harkins for detailed information with regard to compounding of rubber for the various indicated services.

REPORT OF EXECUTIVE SECRETARY
From May 1, 1940 to April 30, 1941

These reports will give the membership full information regarding our finances and branch statistics for the fiscal year.

W. J. R. KENNEDY, *Executive Secretary*

ANNUAL STATEMENT
AMERICAN ELECTROPLATERS' SOCIETY
Year Ending April 30, 1941
RECEIPTS AND DISBURSEMENTS

Balance April 30, 1940		$ 6,778.15
Receipts		
Sale of advertising	$10,570.63	
Sale of REVIEWS	159.96	
Per Capita Tax	6,143.01	
Sale of Proceedings	165.43	
Sale of Buttons	7.95	
Branch supplies	127.25	
Specifications	1.00	
Loan Boston Convention returned	200.00	
Buffalo Branch stationery	7.90	
Dayton Branch gift	600.00	
Exolon Company, reprints	17.00	
Missouri School of Mines, reprints	12.25	
Refund bank exchange	1.48	
Detroit Rex cut	4.36	
Refund, J. L. Downes, traveling	45.00	
		18,063.22
		$24,841.37
Disbursements		
Outstanding April 1940 check	$ 20.10	
Executive Secretary, salary	2,574.00	
Executive Secretary, traveling	1,191.00	
Executive Secretary, office	302.57	
F. Fulforth, office	91.12	
F. Fulforth, traveling	345.44	
E. Candee, office	80.47	
E. Candee, traveling	58.20	
N. Sievering, office	6.20	
N. Sievering, traveling	77.31	
C. Conley, office	19.00	
C. Conley, traveling	82.40	
R. Goodsell, traveling	128.85	
J. L. Downes, traveling	100.00	
J. L. Downes, office	3.10	
W. W. McCord, advertising commission	221.78	
Post Office Deposits	130.00	
Internal Revenue	52.00	
H. S. Sanderson, Auditor	10.00	
Bank Exchange, Canadian checks	14.50	
A. W. Garrett, gift Boston Convention	100.00	
F. Marquardt, stenotyping	250.00	
Loan, Boston Convention Committee	200.00	
L. E. Meacham, Bond, Executive Secretary	25.00	
J. E. Stewart Co., cuts and supplies	130.05	
Copyrighting Proceedings	10.00	
F. Marquardt, printing Proceedings	2,940.04	

Extra copies Proceedings	13.00	
J. E. Stewart Co., printing REVIEWS	7,246.23	
Miscellaneous	297.10	
	$16,719.46	
Bank Balance April 30, 1940		$ 6,778.15
Receipts 1940-1941		18,063.22
		$24,841.37
Disbursements 1940-1941		16,719.46
BALANCE APRIL 30, 1941		
Third National Bank & Trust Co., Springfield, Mass		$ 8,121.91

AMERICAN ELECTROPLATERS' SOCIETY
RECEIPTS FROM PER CAPITA TAX AND BRANCH SUPPLIES
May 1, 1940 to April 30, 1941

BRANCH	Per Capita Tax	Supplies	Per Capita Tax and Supplies Paid in May 1941
Anderson	$108.68	$ 3.00	
Balt.-Washington	118.82	3.00	
Bing.-Syracuse	57.77	1.50	
Boston	249.08	5.50	
Bridgeport	184.29	2.00	
Buffalo	124.89	2.00	
Chicago	623.03	8.50	
Cincinnati	144.47	11.50	
Cleveland	104.63		$119.20
*Dayton	176.14	5.75	
Detroit	682.43	8.00	
Grand Rapids	162.69	4.00	
Hartford	119.48	5.50	
Indianapolis	24.30		33.98
Lancaster	105.98	1.50	
Los Angeles	185.64	5.00	
Milwaukee	232.21	2.00	
Montreal	69.53	2.00	
Newark	332.80	4.00	
New Haven	265.28	6.50	
New York	272.71	4.50	80.93
Philadelphia	426.61	11.70	
Pittsburgh	93.84	1.50	
Prov.-Attleboro	107.34	3.00	
Rochester	230.88	5.50	
San Francisco	58.06	2.00	
Springfield	140.43	2.00	
St. Louis	255.17	9.80	
Toledo	119.48	1.50	
Toronto	172.14		
Waterbury	193.74	4.50	
Credit from Bank, error in Exchange Canadian check	.47		
	$6143.01	$127.25	$234.11

*Credit Dayton Branch with $50.00. Error made in receiving check for 1940 Convention Program.

TENTATIVE REPORT OF MEMBERSHIP TURNOVER
For the Year Ending April 30, 1941

BRANCHES	May 1st 1940	Elections	Reinstatements	Gain by Transfer	Resignations	Suspensions	Loss by Transfer	Death	Membership May 1, 1941
Anderson	38	5			1		2		40
Balt.-Washington	49	1	1		3	3	1	1	43
Binghamton-Syracuse	22	2			1		1		22
Boston	80	18	3	4	1	1	1		102
Bridgeport	71	11		1	5	4	2	1	71
Buffalo	57	1				11	2	1	44
Chicago	225	19	2	4	5	8	1	2	234
Cincinnati	41	11		1					53
Cleveland	70	17		1	2		2		84
Dayton	62	17		1				1	79
Detroit	250	33		5	14	9	3	2	260
Grand Rapids	52	28			1		2	1	76
Hartford	45	7			1		2	1	48
Indianapolis		37		2					39
Lancaster	25	17		3	1				44
Los Angeles	59	57	4			1			119
Milwaukee	84	10				2			92
Montreal	23	8			2				29
Newark	125	15	3	2	2	5	1	1	136
New Haven	119	21			8	28	4		100
New York	102	21	4	1	1	4	1	1	121
Philadelphia	133	22				2	3		150
Pittsburgh	34	11	1	1	2			2	43
Providence-Attleboro	38	1		1			2	1	37
Rochester	62	15		1		1		1	76
San Francisco	20	19				1			38
Springfield	51	14	2	3		1			69
St. Louis	77	6				2		2	79
Toledo	40	7	1		1	2	1		44
Toronto	67	7	1	1	3	6		1	66
Waterbury	66	21	1	2			3		87
	2187	479	23	34	54	91	34	19	2525

(Final membership report will appear in June Issue.)

REPORT OF THE RESEARCH FUND

May 1, 1940 — April 30, 1941

Balance, April 30, 1940		$ 5,829.17
Receipts		
1940-1941		6,264.35
		$12,093.52
Disbursements		
April, 1940 check #167, cashed in May	$ 18.00	
G. A. Lux, traveling	27.20	
G. A. Lux, salary	3,049.36	
M. Berdick, salary	546.00	
Dr. Blum, printing Research paper	112.50	
T. F. Slattery, travel expenses at the Bureau	1,000.00	
A. B. Wilson, office	75.00	
J. E. Stewart Co., envelopes for specifications	14.94	
W. J. R. Kennedy, stamps to mail specifications	42.56	
Divine Bros., 2 photos	8.00	
B. F. Sturtevant, fan and motor	87.60	
District Agency, insurance	52.00	
Collector Internal Revenue	62.86	
A.S.T.M., 3000 copies specifications	90.00	
Gichner & Co., ventilating work at Bureau	33.50	
Dygert Printing Co., supplies	43.00	
		5,262.52
Balance, April 30, 1941 at the Union Trust Co., Springfield, Mass.		$ 6,831.00

Contributions to Research

1940 — 1941

Receipts	
Philip Sievering	$ 10.00
Chrysler Corp.	250.00
F. B. Stevens	100.00
Eaton Mfg. Co.	25.00
E. I. duPont	100.00
The Martin Dennis Co.	50.00
Maas & Waldstein	50.00
Appleton Electric Co.	25.00
Auto Sun Products	10.00
Reynolds-Robson Supply Co.	100.00
Republic Steel Corp.	100.00
Master Electro-Platers Ass'n	25.00
Wald Mfg. Co.	15.00
Robbins & Meyers	25.00
Jones & Laughlin Steel Corp.	100.00
Speakman Co.	10.00
American Brass Co.	25.00
Knapp Monarch Co.	50.00
Taylor Instrument Co.	50.00
Eaton-Clark Co.	25.00
Ainsworth Company	50.00
Carnegie-Illinois Steel	500.00
Leeds & Northrup	50.00
Chicago Flexible Shaft Co.	25.00
Anonymous	44.35
Jas. E. Nagle & Sons	25.00
Great Lake Steel Corp.	100.00
J. C. Miller Co.	100.00

Forstner Chain Corp.	25.00
General Motors Corp.	250.00
Pennsylvania Salt	50.00
Anonymous	30.00
Sargent Co.	25.00
Lobdell Emery Mfg. Co.	25.00
MacDermid Inc.	50.00
Gerity-Adrian Mfg. Corp.	50.00
General Railway Signal Co.	25.00
United Chromium Inc.	200.00
Apothecaries Hall	50.00
Bruce Products	25.00
A. T. Wagner Co.	50.00
Ainsworth Mfg. Corp.	50.00
Acme Steel Co.	25.00
Advance Plating Co.	25.00
American Bosch Corp.	25.00
Appleton Electric Co.	25.00
Auto City Plating Co.	25.00
Auto Sun Products Co.	10.00
The Bastian-Blessing Co.	25.00
Bell Telephone Lab.	100.00
Blake Mfg. Corp.	10.00
Bridgeport Metal Goods	50.00
Chicago Flexible Shaft Co.	25.00
Crane Co.	50.00
Crown Rheostat & Supply Co.	50.00
Cutler-Hammer Inc.	25.00
Martin-Dennis Co.	50.00
Driscoll & Co.	25.00
Egyptian Lacquer Co.	25.00
Electric Products Co.	50.00
J. B. Ford Sales Co.	50.00
Forstner Chain Corp.	25.00
General Electric X-Ray Corp.	25.00
Hallenscheid & McDonald	25.00
Hanson-VanWinkle-Munning Co.	250.00
Harshaw Chemical Co.	200.00
Jones & Laughlin Steel Corp.	100.00
Kalamazoo Plating Works	25.00
Kelly Plating Co.	15.00
Knapp Monarch Co.	50.00
Knight Plating Co.	25.00
Kocour Co.	25.00
Lea Mfg. Co.	25.00
Chas. F. L'Hommedieu	50.00
Maas & Waldstein Co.	50.00
Master Lock Co.	25.00
Matchless Metal Polish Co.	100.00
Meaker Co.	100.00
Mercil Plating Equipment Co.	50.00
Metal Industry Pub. Co.	25.00
Oakite Products Inc.	25.00
Parker Wolverine Co.	100.00
Republic Steel Corp.	100.00
Reynolds-Robson Supply Co.	100.00
Scoville Mfg. Co.	50.00
Seymour Mfg. Co.	50.00
Snap-on Tools Corp.	35.00
Sunnen Products Co.	10.00

Trico Products Corp.	20.00
Udylite Corp.	100.00
Western Electric Co.	50.00
Zapon Co.	25.00
American Hardware Corp.	25.00
International Business Mach. Corp.	25.00
Lasalso Inc.	25.00
Rotary Elec. Steel Co.	50.00
Am. Nickeloid Co.	10.00
Douglas & Lomason Co.	25.00
Proctor & Schwartz	25.00
Am. Radiator & Standard Sanitary Corp.	100.00
N. J. Zinc Co. of Penna.	250.00
The Weatherhead Co.	10.00
Bethlehem Steel Corp.	100.00
General Electric	50.00
Eaton Mfg. Co.	25.00
American Brass Co.	25.00
Carey-McFall Co.	25.00
Atlas Powder Co.	25.00
Total Receipts	$6,264.35

PROPOSED RESOLUTION

Milwaukee Branch has drawn up the following resolution to be presented at the Boston Convention in June:

"Whereas, the American Electroplaters' Society is a society organized for the purpose of advancing the science of electroplating and

Whereas, it is desirable to have closer connections with various educational institutions throughout the country because of the impetus it would give research on metal finishing problems and

Whereas, it is desirable that the American Electroplaters' Society have as members all who are interested in plating and

Whereas, most scientific organizations have special student memberships, therefore be it

Resolved, that the American Electroplaters' Society create a special class of student membership which would permit university students, both graduate and undergraduate to become members at a reduced rate." (Signed) DEXTER F. RHODES

Secretary, Milwaukee Branch

AMENDMENT TO CREATE BRANCH SECOND VICE PRESIDENTS

We submit the following amendments to the Constitution and By-Laws:

CONSTITUTION

Part II. Branch Societies. ARTICLE III. Officers.

Sect. 1. following "a President, a Vice President," to add "*and a Second Vice President.*"

BY-LAWS

Part II. Branch Societies. ARTICLE II. Duties of Officers.

Sect. 2. Vice President: to add to this section, "*He shall be Chairman of the Membership Committee.*"

To add after section 2, the following new section: "*Sect.* 2A. *Second Vice President: It shall be the duty of the Second Vice President to perform the duties of the President, or Vice President, in the absence of either or both, and shall be chairman of the Exhibits Committee.*

The idea behind these suggested amendments is to coordinate the work of the branches and dove-tail into sections 7 and 9 of the "Supreme" part of the Constitution.

Under Section 8 of the Supreme part of the Constitution, the Branch Librarian would coordinate with whatever Supreme Vice President had charge of the Educational Work. (Signed) ERVIN FRAUENHOFF

Secretary, Los Angeles Branch

BOSTON CONVENTION PROGRAM

SUNDAY—JUNE 8

3:00 P.M. Registration—Mezzanine floor, Statler Hotel.

Registration Fees: Gentlemen $5.00; Ladies $5.00. This entitles registrant to book of tickets to be used for all functions and activities. Membership in the Society is not necessary for registration.

MONDAY MORNING—JUNE 9

8:00 A.M. Registration—Mezzanine Floor, Statler Hotel's GEORGIAN ROOM.

9:00 A.M. Welcome to delegates, members, and visitors, *Joe Barron*, General Chairman.

Address: *William Jones*, President, Boston Branch.

Welcome to Boston, *The Honorable Mayor Maurice J. Tobin*.

Presidential Address, *Frederick Fulforth*, President of the American Electroplaters Society.

Business Session.

Presentation of Credentials.

General Reports.

FIRST EDUCATIONAL SESSION—MONDAY AFTERNOON—JUNE 9 —2:00 P.M.

Georgian Room, Mezzanine Floor

Arranged by the educational committee, A. W. Collins, Chairman

JOHN COSTIGAN, Springfield Branch, Presiding.

1. "Application of Salt Spray Test to Electroplated Coatings," by *Dr. William Blum*, National Bureau of Standards, Washington, D. C.
2. "Advantages and Objections to the Salt Spray Test from an Electroplating Point of View," by *Albert Hirsch*, Snyder, Inc., Philadelphia, Pa.
3. "The Use of Rubber in the Plating Room," by *C. P. Mc Hugh*, Chemical Engineer, Manhattan Rubber Mfg. division of Raybestos Manhattan, Inc., Passaic, N. J.
4. "Electropolishing" by *Dr. H. H. Uhlig*, Research division, General Electric Co., Schenectady, N. Y.
5. "Measurement Significance and Control of pH in Cyanide Plating Baths," by *A. G. Gray*, Electroplating division, E. I. duPont de Nemours Co., Inc., Cleveland, Ohio.

MONDAY EVENING—JUNE 9—8:30 P.M.

INTERNATIONAL FELLOWSHIP CLUB—OPEN HOUSE

Grand Ballroom of the Hotel Bradford (few blocks from Convention Headquarters).

This evening's entertainment is sponsored by the International Fellowship Club. A ticket is included in your registration booklet.

Dancing . . . Buffet supper (served by ticket only) . . . Fun . . . Music . . . Get together, get acquainted . . .

SECOND EDUCATIONAL SESSION—TUESDAY MORNING—JUNE 10 8:45 A.M.

Georgian Room, Mezzanine Floor

P. R. LYONS, Cleveland Branch, Presiding.

1. "Composition of Cathode Films," by *Dr. Abner Brenner*, National Bureau of Standards, Washington, D. C.
2. "Electrocolor and Patternplate," by *Dr. J. E. Stareck*, United Chromium, Inc., New York.
3. "Nickel and Copper Deposition in the Printing Industry," by *James E.*

Dowd, Electrotype division, the Conde Nast Publications, Inc., Greenwich, Conn.

4. "Polishing Steel Specimens Prior to Plating for Exposure Test," by *Gerald A. Lux*, Research Associate, A.E.S., Washington, D. C.

5. To be announced.

TUESDAY AFTERNOON—JUNE 10

12 Noon Busses leave Hotel Statler 12:00 Noon, sharp, for trip through the Whiting & Davis Plant, Plainville, Mass., Manufacturers of Ladies' Mesh Bags. Luncheon will be served at the Whiting & Davis Co. Cafeteria by ticket only through the courtesy of the Frederick Gumm Chemical Co.

3:30 P.M Trip through the Warren Telechron Company, Manufacturers of Telechron Clocks, Ashland, Mass. The world's largest electric clock manufacturers.

THIRD EDUCATIONAL SESSION—TUESDAY EVENING, JUNE 10—8:00 P.M.

Georgian Room, Mezzanine Floor

W. M. PHILLIPS, Detroit Branch, Presiding.

1. "Throwing Power of Plating Solutions," by *George B. Hogaboom*, Hanson-VanWinkle-Munning Co., Matawan, N. J.

2. "Effects of Impurities in Plating Solutions," by *Dr. Walter Meyer*, Editor *Metal Finishing*, 116 John Street, New York.

3. "Physical Removal of Impurities from Plating Solutions," by *Walter A. Helbig*, Chemical Engineer, Darco Corporation, New York.

4. "Chemical and Electrochemical Methods for the Purification of Plating Solutions," by *O. A. Stocker*, Electrochemist, The Rufert Chemical Co., Division of The Seymour Mfg. Co , Seymour, Conn.

5. "Removal of Chromium Contamination in Alkaline Plating Solutions," by *Dr. M. M. Beckwith*, J. B. Ford Sales, Wyandotte, Mich.

6. "Electroplating Education," by *Dr. C. B. F. Young*, Head, Institute of Electrochemistry and Metallurgy, New York Consultant.

OUTING—WEDNESDAY MORNING—JUNE 11—8:30 A.M.

Busses leave promptly at 8:30 A.M. from the Hotel Statler for a beautiful, morning tour to the landing place of the Pilgrim fathers. Historic Plymouth, Mass; and Pilgrim Shore, going through Quincy, Weymouth, Hingham, Duxbury, Marshfield. This is a historical tour to the cradle of infant New England and through a region where still dwell the descendants of those who first landed on Plymouth Rock which you will see, and laid the foundations upon which our nation was builded. Here are beautiful ocean views, lakes, pine forests and cape cottages and here are typical New England Villages, many of which have changed but little in three hundred years except to grow more beautiful with the passing of time.

Busses leave Plymouth at 1 o'clock for Pemberton Inn, Hull, Mass., for a REAL NEW ENGLAND SHORE DINNER (Included in your registration booklet.) Ocean Swimming . . . East vs. West Baseball Game . . . Golf Tournament . . . Recreation Games.

Final Bus will leave Pemberton Inn for Boston at 5:45 P.M.

FOURTH SESSION—WEDNESDAY EVENING—JUNE 11—8:00 P.M.

Georgian Room, Mezzanine Floor, Hotel Statler

DR. WALTER R. MEYER, Bridgeport Branch, Presiding.

1. "The Uses and Limitations of Radiant Heat for Baking Organic Finishes," by *Dr. Gustave Klinkenstein*, Vice-President, Maas & Waldstein Co., Newark, N. J.

2. "Modern Methods of Copper Plating," by *F. F. Oplinger*, Electroplating division, E. I. duPont de Nemours Co., Wilmington, Del.

3. "Electropolishing Stainless Steel in Phosphoric Sulphuric Acid Baths,"

by *C. L. Faust* and *H. Pray*, Battelle Memorial Institute, Columbus, Ohio.
4. "Unichrome Copper," by *T. G. Coyle*, United Chromium Corp., New York.
5. "The Contamination and Cleaning of Cold Rolled Steel," by *Ernest H. Lyons, Jr.*, Chemist, The Meaker Co., Chicago, Ill.

FIFTH SESSION—THURSDAY MORNING—JUNE 12—9:00 A.M.
Georgian Room, Mezzanine Floor, Hotel Statler

CHARLES T. McGINLEY, St. Louis Branch, Presiding.
1. "Copper Oxide Rectifiers for the Electroplating Industry," by *Mr. I. Albert Lee*, Bridgeport Branch.
2. "Die Cast Finishing," by *Martin F. Maher, Jr.*, New York Branch.
3. "An Educational Program for Everyone" by Rochester Branch.
4. Cincinnati.
5. "Electrolytic Polishing," by *Harold M. Lang*, New York Branch.

THURSDAY AFTERNOON—JUNE 12
Georgian Room, Mezzanine Floor, Hotel Statler

1:30 P.M. Final Business Session.
Election of Officers.
Selection of the 1942 Convention city.

THURSDAY EVENING—JUNE 12
Hotel Statler Main Imperial Ballroom, Mezzanine Floor.

7:00 P.M. Banquet . . . Stage Show . . . Dancing.

LADIES PROGRAM

SUNDAY AFTERNOON—JUNE 8

3:00 P.M. Registration.

MONDAY—JUNE 9

9:00 A.M. Attend opening of Convention with the men. The ladies will then meet in the Imperial Ballroom Foyer of the Hotel Statler for an informal period to get acquainted and review the week's activities.

1:00 P.M. Luncheon will be served to the ladies in the Palm Room of the Hotel Statler. The remainder of the afternoon, following luncheon, will be open.

8:30 P.M. THE INTERNATIONAL FELLOWSHIP CLUB cordially invites all registrants, men and women, to attend their OPEN HOUSE and BUFFET SUPPER, by ticket only, in the Grand Ballroom of the Hotel Bradford. There will be dancing and entertainment and this promises to be an outstanding success, judging from their previous parties.

TUESDAY—JUNE 10

9:15 A.M. Sight Seeing trip around Boston. The ladies will meet promptly at 9:15 A.M. in Room 419 of the Hotel Statler, which has been designated as the official meeting place for the ladies throughout the remainder of the Convention. The busses, stationed outside the Hotel, will leave promptly at 9:30 A.M. This tour should prove to be of great interest to our out-of-state visitors, as well as native Bostonians. Stops will be made at such places as Bunker Hill Monument, Faneuil Hall, Old North Church, Old South Meeting House, Paul Revere House, Charles River Esplanade, Beacon Hill (Louisburg Square), Old State House, New State House (built by Bullfinch), and many other interesting places.

12:30 P.M. Luncheon will be served at the famous Seiler's 1775 House

in Lexington, Massachusetts, where typical New England atmosphere prevails. There will be a distribution of gifts with the compliments of the American Electroplaters Society. There will be a short rest period between lunch and the rest of our sight seeing tour.

2:00 P.M. Leaving the 1775 House we will visit the historic towns of Lexington and Concord with stopovers at the famous battlefields. We visit the Cradle of American Liberty and the homes of America's foremost authors: Longfellow, Lowell, Hawthorne, Emerson, Alcott and Thoreau. On the way back we will visit Cambridge, taking in Harvard University with a stop at the Agassiz Museum to see the world famous glass flowers.

7:30 P.M. The ladies will meet in Room 419 at 7:30 P.M. ready to leave by taxi for Symphony Hall to hear a "POPS" Concert by the Boston Symphony Orchestra under the direction of Arthur Fiedler, which should be one of the high lights of all the events. Light refreshments will be served during the concert through the courtesy of the M. E. Baker Company. We will return to the hotel by taxi.

WEDNESDAY—JUNE 11

8:30 A.M. An all morning bus cruise down the Atlantic Coast for both men and women to historic Plymouth, the landing place of the Pilgrims, taking in Quincy, Weymouth, Hingham, Duxbury, etc. on the way to the Cape. There will be a lecturer on each bus to explain the points of interest. At Plymouth we will see Plymouth Rock, Burial Hill, Pilgrim Hall, and famous Plymouth Harbor.

2:00 P.M. We will lunch at Pemberton Inn in Hull, Mass. There will be a shore dinner such as New England only can serve. There will be music and dancing. Following the Luncheon, the International Fellowship Club will sponsor a "BEANO" party in the Imperial Ballroom Foyer under the direction of Joan Trumbour. Prizes will be awarded. Sport activities will include a golf tournament, a baseball battle between the East and the West, and swimming if the weather permits.

8:30 P.M. The ladies are cordially invited by David X. Clarin, Aunt Ella's Personal Secretary, to attend the Third Annual Party of the AUNT ELLA SOCIETY in Parlors D and E of the Hotel Statler. There will be an old-fashioned song festival and light refreshments will be served. This party is made possible through the courtesy of Oakite Products, Inc.

THURSDAY—JUNE 12

10:15 A.M. The ladies will meet in Room 419 of the Hotel Statler ready to leave by taxi for the ISABELLA STEWART GARDNER MUSEUM, in the Fenway, where there will be a guided tour through the Museum. The ISABELLA STEWART GARDNER MUSEUM has one of the finest private collections of art in the country, and is especially famous for its Masterpieces of Italian Painting. It also includes outstanding examples in other fields of Art. The architecture of its Court suggests the palaces along the Grand Canal in Venice and the flowers with which it is filled are a delight to visitors. We will return to the hotel by taxi.

7:00 P.M. The Annual Banquet and Dance will be held in the Imperial Ballroom of the Hotel Statler. This will be the Grand Climax to Convention Week.

INTERNATIONAL FELLOWSHIP CLUB PROGRAM

By TOM TRUMBOUR, Secretary

As usual the International Fellowship Club will play an important part in entertaining the registrants of the 1941 A.E.S. Boston Convention. The program is as follows:

Annual Luncheon—Monday, June 9 at 12:00 Noon
Room 419, Statler Hotel

The Boston Committee has set the time for the opening educational meeting

at 2:00 o'clock. This will allow us ample time to hold our annual meeting and adjourn in time for the educational program.

The order of business: Lunch, Election of Officers and Discussion of Arrangements for Open House.

Since our Annual Meeting offers an opportunity for all suppliers and their representatives to meet in a friendly atmosphere we would appreciate a 100 percent attendance at this gathering.

OPEN HOUSE

Monday Evening, June 9—Bradford Hotel

The purpose of Open House, held on the first night of the convention, is to offer an opportunity for all registrants to become acquainted as well as to create good will in the plating and finishing industry. This outstanding entertainment feature of the convention is provided by the liberal contributions of firms selling to the industry. These firms and their representatives invite you to attend. A program, including list of contributors, will be distributed to registrants.

An Announcement

On Tuesday, March 25th, 1941, Mr. David X. Clarin (Oakite Products, Inc.), Mr. John C. Oberender (Zapon Company), of the International Fellowship Club, and Mr. Joe Barron (M. E. Baker Company), General Chairman of the Boston A.E.S. Convention Committee, held a meeting at the Statler Hotel with reference to holding the Fellowship Club Supper Dance on Monday night, June 9, 1941.

Due to previous commitments to M.I.T. the Hotel Statler folks said that it was simply impossible to care for so large a party on the night of June 9th.

After careful consideration of the entire matter, the committee of three arranged for the holding of the buffet supper dance in the grand ballroom of the Bradford Hotel, a short distance away from the Hotel Statler. The accommodations at the Bradford Hotel will enable the International Fellowship Club to extend to their friends in the plating fraternity their usual splendid opportunity to get acquainted and to enjoy themselves thoroughly.

As has been the case on previous occasions, an excellent buffet supper has been arranged for, and the music for dancing will be furnished by one of Boston's well-known dance orchestras.

Admission to the supper dance will be by Fellowship ticket only.

Open House Program

Music by one of Boston's leading orchestras
Grand Opening 8:30—Music, Dancing and Refreshments
Buffet Lunch—10:15 until closing

MENU

Olives—Radishes—Pickles
Cold Cuts
Baked Beans
Brown Bread—Rolls
Potato Salad
Assorted Pies—Coffee

(On this occasion the Club has taken care of gratuities to your waiter.)

LADIES PARTY—MONDAY AFTERNOON—JUNE 9

This party is one of the outstanding features of the Ladies Program. See the Ladies Program for details of this party and outing. Mrs. Joan Trumbour Wiarda will represent our club and Ann Baker, the Boston Committee.

FELLOWSHIP GOLF TOURNAMENT—JUNE 11—2:30 P.M.

Arrangements for our Annual Golf Tournament have been completed with the South Shore Country Club, Hingham, Mass., attention Mr. F. W. Blanchard. A special golf bus will leave the hotel Wednesday morning nine o'clock. Immediately after the tournament we will proceed to Plymouth to join the Convention party at the shore dinner. Details, including transportation, trophy, etc. will be fully explained in our Fellowship Folder, which will be enclosed in convention envelopes distributed at the Registration Booth.

The Fresh Pond Golf Club, of Cambridge, attention Mr. S. H. Mahoney, which is only 15 to 20 minutes from the Statler Hotel has granted us the courtesy of play and club house facilities for the entire convention period—green fee 75 cents.

Be sure to come prepared to enter our tournament.

A.S.T.M. ORGANIZES STANDING COMMITTEE ON ELECTROPLATING

The A.S.T.M. has long been interested in electroplated coatings. Probably the first work done by the Society in this field was handled by A-5 on "Corrosion of Iron and Steel." This committee carried on extensive outdoor exposure tests on plated commercial shapes and also cooperated very intimately with the A.E.S. and the Bureau of Standards in the exposure tests and standardization of electroplated coatings on steel. Committees B-3 on "Corrosion of Nonferrous Metals and Alloys" and Committee B-6 on "Die Cast Metals and Alloys" have cooperated when plating on nonferrous base metals was involved.

The work of these various committees, their sub-committees, and the joint committees with A.E.S. finally progressed to a point where it was felt that it could better be handled by one standing committee. The formation of Committee B-8 on "Electrodeposited Metallic Coatings" was then authorized by the executive committee of the A.S.T.M. Following much spade work by a steering committee under the chairmanship of Mr. E. A. Anderson of The New Jersey Zinc Company, the new committee was formally organized at the Spring meeting of the A.S.T.M. The following officers were elected: E. M. Baker, Chairman, Professor of Chemical Engineering, University of Michigan, Ann Arbor, Michigan; E. A. Anderson, Vice-Chairman, New Jersey Zinc Company, Palmerton, Pennsylvania; Gustaf Soderberg, Secretary, The Udylite Corporation, Detroit, Michigan.

The initial membership is thirty, of which fourteen are representatives of producers of electrodeposited coatings, three members are consumers of electroplated articles, and thirteen are general interest members, mostly consulting engineers and suppliers to the industry.

At its meeting and subsequently through letter ballots, the new committee approved, for presentation to A.S.T.M. this summer, two new specifications dealing with copper-nickel-chromium coatings on zinc and zinc base alloys, and nickel and chromium coatings on copper and copper base alloys. The committee also voted to propose certain changes in the Tentative Specifications A166 for Electrodeposited Coatings on Nickel and Chromium on Steel, and A219 on Tentative Methods of Test for Local Thickness of Electrodeposited Coatings on Steel.

The next meeting of Committee B-8 will be held at the annual meeting of the A.S.T.M. this June. At this time the committee will begin to organize into sub-committees and get down to work.

This committee offers a new channel for improving the quality of plating and should prove an important means for further development of the plating industry. It is hoped that it will receive the same support by the A.E.S. which the parent committees have enjoyed in the past.

Here and There

NEWARK BRANCH BANQUET

The Newark "boys and girls" are pretty well satisfied with the results of the weeks of preparation leading up to the very successful 29th annual Educational Session and Banquet, held at the Hotel Robert Treat on Saturday, April 26.

The popular President of Newark Branch, William T. Maguire, opened the Educational Session with a few well chosen words of welcome, after which he introduced Louis Donroe as Chairman.

Floyd Oplinger of the E. I. duPont Company was the first speaker, his subject being "Tin Plating and its Applications." He was followed by H. E. Haring of Bell Telephone Laboratories, whose subject was "Corrosion." Dr. Walter Meyer spoke on "Engineering Aspects of Electroplating" and George B. Hogaboom, Hanson-VanWinkle-Munning Co., chose for his subject "Design for Finishing."

The banquet in the evening was all that one could wish for. Three hundred and sixty-two persons did full justice to a well cooked and well served meal, made even more pleasant by the courtesy of the committee in charge. Music, singing and dancing were indulged in between courses. Entertainment and square dancing, by the "Barnyard Boys" kept the crowd on their toes from 11 P.M. until the early morning hours.

The Ladies Auxiliary, with Mrs. George Reuter as President, entertained their visiting sisters during the afternoon. Games were played and lunch was served.

Philadelphia and New York Branches were well represented. The New England Branches also turned out in fairly good numbers.

The Frederick Gumm Chemical Co. of Kearny, N. J., held open house from 9 A.M. to 2 P.M.

Joe Barron, Andy Garrett and Arthur Mintie, the Boston Convention Minute men, came to New York by boat. President Fulforth and Vice Presidents Candee and Sievering, with their wives, were also present.

What would these events be like without the one and only Horace Smith? We wonder.

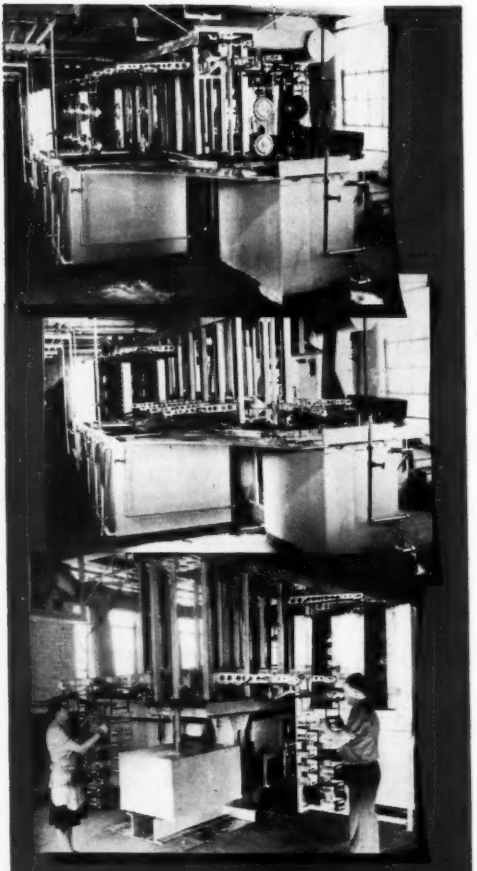
The Barnyard Boys were extremely popular. Their program is pretty strenuous though. We saw some of the boys who thought "they could take it," mopping their brows rather frequently. Ask John Kotches, and some of the others.

We retired early (in the A.M.) but chose the wrong floor, the 10th. Every hour the parade passed by our door; each time the singing got worse; finally peace and time to get up to catch our train for home. Oh well! we had a good time, in fact, this was one of the best meetings we've ever attended in Newark. The Chairman and committees, both men and women, deserve our heartiest congratulations for an event that will be long remembered.

PROVIDENCE BRANCH

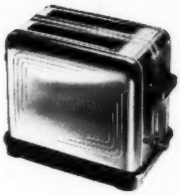
The meeting at the Hotel Biltmore on Monday evening, April 21, was presided over by the President, Donald Wood. First vice-president of the National Society, E. T. Candee of Waterbury, presented two reels of motion pictures telling the story of copper from mine to consumer.

Previous to this interesting and educational feature, there was a long dis-



Photos above show the H-VW-M Elevator Type Full-Automatic Conveyor recently installed at Manning, Bowman.

Top: Elevator in up position. Center: Elevator in down position. Bottom: Operators loading (right) and unloading (left).



HOW MANNING, BOWMAN & CO. SPEEDS PLATING, CUTS COSTS

The new H-VW-M Elevator Type Full-Automatic Conveyor, recently installed at the Meriden Plant of Manning, Bowman & Co., is considered "a definite improvement over former similar equipment." (See letter on facing page.)

Like all H-VM-M Conveyors, this machine is properly designed and ruggedly built to insure uniform plating results and continuous operation. Predominant features are simplicity, with few moving parts; ease of operation; faster plating; wide range of stations available; ample current capacities; elimination of losses from rejects; low maintenance costs; and freedom from mechanical troubles. Our engineers are capable of interpreting your plating and production problems and recommending conveyors to best fit your particular needs.

Parts for the three well-known Manning, Bowman electrical household devices illustrated above and below are plated with H-VW-M equipment.

Write for complete information or request our engineers to call and discuss your problems.

Manufacturers of a complete line of electroplating and polishing equipment and supplies

HANSON-VAN WINKLE-MUNNING CO.

MATAWAN, NEW JERSEY

ELECTRIC APPLIANCES
VACUUM JUG SETS
GIFTWARES

Craftsmen in metal since 1864

200 FIFTH AVENUE, NEW YORK
150 POST STREET, SAN FRANCISCO
MERCHANDISE MART, CHICAGO

MANNING, BOWMAN & CO.
MERIDEN, CONN.

March 17, 1941

Hanson-Van Winkle-Munning Company,
Matawan, N. J.

Gentlemen:

The H-VW-M Elevator Type Full Automatic Conveyor installation in our Meriden Plant is a definite improvement over former similar equipment and marks a modern advance in the electroplating industry.

During the past twenty years, we have purchased many special machines, but this is one of the few times, if not the one exception, where such a piece of apparatus automatically handling so many operations has properly functioned, and gone into production, the same day that it started turning over.

Very truly yours

MANNING BOWMAN CO.

E. A. Farr

General Superintendent.

E.A.Farr

cussion in connection with the possibility of increasing attendance at the meetings and adding new members to the Branch. All agreed that Providence, with its reputation as a plating center, should be one of our strongest branches, as it was several years ago.

There are many local conditions, however, that hinder the progress of the A.E.S. Some of these obstacles were freely discussed and something will be done about surmounting them. In a long talk with the Branch officers, who are fully alive to their responsibilities, it was agreed that a greater effort will henceforth be made to increase the interest at the meetings, giving the members more talks on the plating of the precious metals. Subjects of this nature are of particular value to Providence-Attleboro branch because of the type of work being done in this section.

All future meetings of the Branch will be held at the Biltmore Hotel and will be preceded by a lunch. A large attendance is hoped for by the officers in charge, both at the meal and the meeting immediately following.

TWENTY YEARS A MEMBER OF THE BOARD OF TRUSTEES

John Oberender, well-known representative of the Zapon Lacquer Company, and member of New Haven Branch has recently completed 20 consecutive years' service as a member of the Board of Trustees of the Bridgeport and New Haven Branches.

Mr. Oberender has always taken a keen interest in the welfare of the A.E.S. and has never used the Society in connection with his work. Were it not for the fact that his business takes him out of town so much, which makes it impossible for him to attend the meetings regularly, he would have continued to serve his branch in again accepting the office which was offered to him.

Faithful service, such as has been rendered by Mr. Oberender, is worthy of honorable mention which is given herewith. Both Mr. and Mrs. Oberender are familiar figures at nearly all the social functions of the Society and are active in promoting the welfare of the A.E.S. in many ways.

CLEVELAND, TOLEDO, AND DAYTON JOINT MEETING

We have had the pleasure of attending many joint meetings this year, but none has been more successful than the first get-together of the above branches on Saturday, May 10, at the Cleveland Hotel, Cleveland, Ohio. Mr. Charles C. Conley of Dayton had the idea of joint meetings in several sections of the middle west since the convention in Dayton last year, of which he was general chairman. Toledo Branch with Vic Miner in charge of things and Fred May ably assisting, gave the idea the needed impetus; then Cleveland's live wire organization got busy. With men like Ross Lyons, president of the branch, Joe Singler, W. Scott, and others, the event was an assured success from the start.

We can't add a single suggestion regarding the program that would improve it in any way. The speakers were exceptionally good, particularly Dr. Zay Jefferies of The General Electric Company, Nela Park, Cleveland, Ohio, whose subject was "Strategic Metals." Dr. Jefferies gave us a clearer insight into why the various metals used in electroplating are becoming less and less available for the plating industry. A great many questions were asked. However, his remarks were not for publication.

Mr. Vernon Burt, a Cleveland lawyer, representing the OPM, went very fully into the activities of the government's interest in the conservation of nickel, chromium, zinc, and tin and told of the fine cooperation between industry and the government, especially where surplus supplies of materials were concerned.

First Vice-President E. T. Candee presented the picture "From Mine to Consumer" showing the various stages of copper production. Dr. Walter Meyer spoke on "Special Uses for Plated Coatings."

Mr. Conley was technical chairman, while Mr. Lyons operated the picture

machine. Two hundred men and women enjoyed the steak dinner. This was followed by an entertainment featuring several humorous acts which were loudly applauded. Each lady present was given an atomizer as a reminder of the occasion.

Toledo Branch and particularly Vic Miner are worthy of special mention. Nearly all the Toledo members and their wives showed up. That's cooperation plus. We missed Fred May who was with us in spirit. Fred and Vic make a good team. Don't let them get cold, Toledo Branch, just because they are out of office. The program alone is a tribute to their earnest determination.

Charlie Conley had the educational session thrown in his lap at short notice. Nice work, Charlie. You need make no apologies.

Holding the meeting a little earlier in the season and a little advance publicity will make some of the other middle west branches know there is competition ahead.

The Cleveland Hotel is an ideal spot for meetings of this nature. The boys there are plugging for the A.E.S. in '42; so are the Buffalo and Grand Rapids members.

The long journey to and from Cleveland was well worth while. Mr. Conley's idea worked; now let's include Cincinnati, Anderson, Indianapolis, and Pittsburgh another year. They are all worthy and all good fellows.

THIRD ANNUAL MEETING OF NEW ENGLAND BRANCHES

The Stratfield Hotel, Bridgeport, Conn., was chosen as the meeting place for the Third Annual meeting of the New England Branches on Saturday, May 3, 1941.

Ray O'Connor was General Chairman and William Gray was Technical Chairman. The speakers were Dr. Samuel Glasstone of Princeton University, Dr. Louis Weisberg, Consulting Chemical Engineer, N. Y., Mr. John P. Hubbell, Singmaster & Breyer, N. Y., and Mr. Morris Stone of Pittsburgh, Penna. The Educational Session, which opened at 2:30 P.M. was well attended, all four speakers being listened to with close attention. Dr. Weisberg's address on "Bright Copper Plating" and Dr. Glasstone's paper on "Some Problems of Electrolysis" caused quite lengthy discussions. Mr. Hubbell chose a most interesting subject, "Zinc Plating Direct from the Ore," while Mr. Stone told of "Electroplating Tin Strip." We hope to publish all four papers in future issues of the REVIEW.

The Banquet at seven was not so well attended as in other years, due no doubt to the number of men working overtime. There were about three hundred present, however, which made a nice party.

The ladies were entertained in the afternoon by the Committee in the charge of Mrs. O'Connor. Games were played and lunch served. Each lady was presented with a relish dish of glass with a chrome plated cover and base. After the dinner there was dancing and entertainment which lasted well into Sunday morning.

Much credit is due Ray O'Connor and his committees for the success of the day's activities, both Educational and Social. All New England Branches were well represented. Members from New York, Newark, Baltimore-Washington and Philadelphia were also present.

MOVIES AT THE CONVENTION

At the last Boston Branch meeting, Mr. Al Baker, of the M. E. Baker Company, who has just returned from a trip to Cuba announced that, at the convention outing on June 11 at Pemberton Inn, sound moving pictures will be taken in technicolor of the day's events.

Business and Social News

BRANCH NEWS

Educational Activities

AMERICAN ELECTROPLATERS' SOCIETY

Hartford Branch. The March meeting was held at the Hartford Electric Light Company Building, Pearl St., Hartford, Conn., March 17, 1941.

The speaker of the evening was Sam Tour, Vice-President of the Pitkin Company, New York City, who spoke to us on "Electropolishing." Mr. Tour sketched for us the development of the different processes used for this purpose. The earliest bath was a perchloric acid and acetic anhydride mixture which was fairly efficient but of a very explosive nature. The next bath was a mixture of sulphuric and hydrofluoric acids which is very corrosive but nonexplosive. The Pitkin bath is a mixture of sulphuric and phosphoric acids with different addition agents for each type of metal. Lead tanks are used, current densities run from .1 amp. per square inch for aluminum to 2 or 3 amps per square inch for steels. The work is used as an anode.

Apparently much work has been done on stainless steel, but nearly all types of metals including steel, brass, nickel, silver, and aluminum can be electropolished. Difficulty has been experienced with leaded brasses, high silica aluminum alloys, and high silica and free carbon in cast iron and steel. Polishing costs run higher for this method than regular polishing, but articles that cannot be readily polished especially inside of cup-shaped articles and inside of fabricated parts can be given a very satisfactory finish.

Sam certainly knew his stuff and answered many questions.

APLEY N. AUSTIN, *Secy.*

Bridgeport Branch held its regular monthly meeting April 3 at 8:00 P.M. at the Stratfield Hotel with President John E. Charleson presiding. We were honored with two guests, Mr. W. A. Helbig of the Darco Corporation and Dr. M. Beckwith of the J. B. Ford Company.

Dr. Walter H. Meyer, member of the advisory board, gave a report regarding the speakers for the Third Regional Meeting to be held in Bridgeport, Conn. Mr. J. G. Sterling, secretary of the committee, gave a report of the Special meeting which was held March 29 at the Hotel Elton, Waterbury. Eugene Phillips of the Hotel and Banquet Committee reported good progress and as chairman of the exhibits committee gave us his final report and instructions on exhibits to be held at the Boston convention in June.

Mr. Phillips reported the illness of Wilbur Stratton but stated that Mr. Stratton feels OK now.

The following men were elected to serve as officers for the coming year: President, John E. Charleson; Vice President, Charles E. McElroy; Secy. and Treasurer, Joseph G. Sterling; Librarian, Clarence C. Helmle; Sergeant at Arms, John Schneider; Board of Managers, B. F. Kusterer, Wilbur Stratton, Wm. Thompson.

Committees appointed by President John E. Charleson are as follows: Sick Committee: Eugene Phillips, Chairman, Fred Gotthardt, Stavin Pochna; Membership Committee: R. J. O'Connor, Chairman, Wm. A. Ehrencrona, Eugene Phillips, Fred Gott-

Storts Tanks Are Used Here Because They Pay

—IT PAYS—

TANKS WITH OR WITHOUT LININGS MADE FROM

Armco Ingot Iron Plate
Monel Metal
Everdur Metal
Aluminum
Tellurium Lead
Chemical Lead
Antimony Lead
Antimony-Tellurium Lead
Tin-Lead
Stebbins-Brick Lining
Rubber Lining
Stainless Steel

***WHEN*—you procure the right materials . . . rightly designed and fabricated . . . for the right purpose and use . . . in the right way.**

***WHEN*—you make your tank and other welded fabrication problems . . . our problems . . . by placing the responsibility in our hands.**

STORTS WELDING COMPANY

42 Stone Street Meriden, Conn.

Manufacturers of Welded Fabrications to Specification

hardt, Charles McElroy, Elmer Munson.

Dan Lehener requested resignation from the Branch due to engaging in a different class of work.

Mr. Helbig was introduced to the Branch by Dr. Meyer.

Librarian Clarence C. Helmle introduced Dr. Beckwith of the J. B. Ford Company. Dr. Beckwith discussed the highlights of his work on copper plating solutions which were contaminated with hexavalent chromium and its effect on the copper deposit on die casting. This precipitated one of the most enthusiastic discussions this branch has experienced in many days.

JOSEPH G. STERLING, *Secy.*

Providence-Attleboro Branch held its regular meeting April 21 at the Biltmore Hotel. The first part of the evening was devoted to business. It was decided that hereafter meetings will be held at the Biltmore and will be preceded by dinner served in the same room.

The members were pleased to have present both Mr. Candee and Mr. Kennedy. Mr. Candee gave a talk and presented his very interesting film "The Story of Copper." A discussion period followed.

R. D. MACLACHLAN, *Secy.*

Rochester Branch held its regular monthly meeting on Friday, April 18 at the Seneca Hotel. Regular business was transacted after which the meeting was given over to a discussion of the present situation as regards metals for plating and the nickel situation in particular. It was brought out that the small job shop operators are running into difficulties in trying to obtain nickel anodes because of the fact that they had bought none in 1940. The use of inert anodes was discussed and the problems which would arise from their use. The use of a cadmium-zinc alloy was discussed also in place of the pure plate of either. After a lengthy discussion the meeting was adjourned.

JUDSON R. ELSTER, *Secy.*

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Detroit Branch held its regular meeting on April 4 at the Hotel Statler. Dr. Chas. L. Faust gave a talk on "Alloy Deposition." The officers elected for the coming year are: President, W. L. Pinner; Vice President, James E. Fritts; Secretary-Treasurer, Warren Grimmer; Librarian, Edgar Hahn; Board of Managers, Chas. Beaubien, W. W. McCord and H. M. Cherry.

Elected delegates to the Convention are A. B. Wilson, W. L. Pinner, and C. E. Heussner; with C. F. Nixon,

Jesse Bunch, and T. S. Eichstaedt as alternates.

A movie from the Bureau of Mines entitled "The Power Within" showing the workings and "inards" of an automobile kept the members attentive for 20 minutes.

Following is an outline of Dr. Faust's paper.

Many thousands of pounds of alloys are deposited annually in decorative and protective finishing of metals and in increasing amounts in engineering application. Alloy deposition involves special problems. These have been identified and solved for several systems. In research and practice alloy deposition has shown numerous definite advantages.

The first step in developing an alloy plating process is to find a suitable bath from which the metals can be codeposited under commercially operable conditions, with desired physical properties and composition. Over 350 references to alloy plating results are available in the technical literature. From these, the alloy plater has a good chance of obtaining a preview of the type of bath he is likely to need.

The method of using electrode and deposition potentials for determining probable alloy plating bath compositions was discussed. It was shown that such measurements merely indicate what types of solutions might be alloy plating baths, but these measurements definitely show which are the most promising for use in the experimental work. Successful alloy plating requires an empirical knowledge of how a change in each of the variables: current density, temperature, agitation, addition salts, pH, etc., effects the plate composition and properties and the plating efficiency. One must also understand the interdependence of these variables on influencing the plating results.

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Regardless of how well the cathode control can be maintained, the commercial success depends largely on the anode process in alloy deposition. This can be based on the use of (1) soluble alloy anodes, (2) soluble anodes of each metal separately controlled from a two anode bus bar hookup, or (3) use of insoluble anodes. Data illustrating the use of (1) and (2), the more suitable of the three methods, showed the essential control factors and pitfalls as represented by plating results with Cd-Ag and Ag-Pb alloys, deposited for bearings. These two alloy systems contain the major problems to be met in any alloy plating project.

The most recent alloy plating process to be introduced is white bronze, containing 40% to 50% tin. Although having a hardness between nickel and

chromium plate, the alloy is more easily buffed and colored than is nickel plate. Tarnish resistance is very great indoors and remarkably good in many outdoor conditions. The alloy is deposited from the cyanide type of bath, directly on most of the common metals such as copper, bronze, brass, nickel-silver, steel, nickel, etc. An undercoating metal may be desirable but is not essential in the case of steel.

The plating control is well within the ability of the plating department capable of depositing the bright metals. As in the case of any alloy plating process, special problems exist, but these have been worked out and relatively wide ranges in operating conditions are permissible.

W. W. WILSON, *Secy.*

Los Angeles Branch. Immediately after the members had finished dinner two moving pictures were shown by the Norton Company. The first, "Let's Go Fishing," destroyed practically all interest in anything connected with work. The spring fever germs, which are just beginning to come to life were so activated by this picture of fishermen pulling in trout, bass, and salmon the size of whales that only the most strenuous effort on the part of the Sergeant-at-arms prevented the group from rushing, in a body, to the nearest fishing hole. When order had been restored the second picture, "Norton Abrasives," was screened. This picture enlightened most of us who had no idea of how the abrasives we are so familiar with were produced.

The Branch members of the Supreme Society reported unfavorably on the proposed amendment to the Constitution submitted by Cleveland Branch. The Branch voted to abide by this recommendation.

Mr. M. D. Rynkofs, chairman of the Banquet and Educational Session Committee made his final report of the 1941 affair.

The Branch is well aware that the outstanding success of this year's affair was due in a large measure to the chairman who gave so unstintingly of his time.

Mr. Frank Rushton, Chairman of the Membership Campaign Committee reported that according to Mr. Fulforth's telegram Los Angeles Branch has gone over the top. Mr. Rushton lauded the cooperation of every member in the Branch. The results of this Committee are proven by the membership list.

It was suggested that it would be advisable to make arrangements with the Hotel for a larger meeting room as our present quarters are too small for our present membership.

Mr. Noll and Mr. Ross, visitors from

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Timm Aircraft Corporation were introduced.

At this time elections of officers for the coming year were held:

Mr. Bedwell was unanimously elected president to succeed himself. Mr. Bedwell accepted his election to his second term as president with the statement that he was unalterably opposed to a third term on principle. Vice-President Frank Rushton, Secretary-Treasurer Ervin Frauenhoff, and Librarian Emmett Holman were unanimously re-elected as was the Board of Managers, Ernest Lamoureux, C. E. Thornton, and Earl Coffin. C. C. McLaren was re-appointed Sergeant -at-arms.

Ernest Lamoureux, John Merigold, and Ernest Francis were elected delegates to the National Convention in Boston and Bruno Schindler, Charles Russill, and Ray Solivan were elected alternates.

Mr. Rushton was appointed chairman of the Membership and Entertainment Committee and Bruno Schindler, C. C. McLaren, and Gilbert Bishop were placed on the committee to assist him.

Mr. Delos Eldered of the E. I. du Pont de Nemours Company read a paper by Mr. Floyd Oplinger of the same company on "Recent Developments in Copper Plating." Mr. Eldered also told of his personal experience with this process. Mr. Eldered's talk aroused the interest and held the attention of all those present as was evidenced by the questions asked at its conclusion.

ERVIN FRAUENHOFF, *Secy.*

Buffalo Branch held its regular monthly meeting at the Bailey Bowling Academy, April 11 with President Joe Ruff in the chair.

The minutes of the previous meeting

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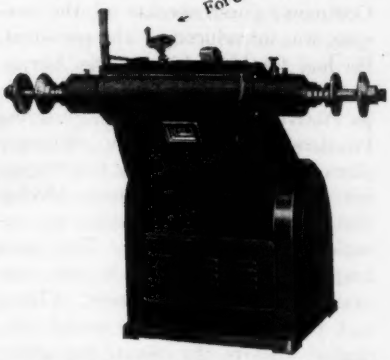

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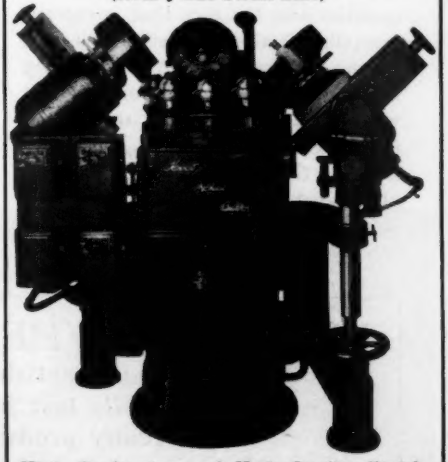

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were approved as read. A financial statement was given by Mr. Frank Nowakowski. A committee was appointed to take care of our annual picnic, which is to be held at Jamestown this year.

Mr. Bernick of the Alsop Engineering Company, guest speaker of the evening, was introduced by the president. He had for his subject "The Advantages of Good Filtration in Relation to Activated Carbon and Purifying Powders." Modern high efficiency plating with bright nickel, bright copper, etc., had caused troubles to develop that were hitherto unknown or unnoticed in the industry. The most frequent source of trouble was contamination of the solution. Filters had to be devised that would adequately remove the minute impurities that inevitably find their way into a solution. Of these impurities, oil was the most troublesome. Activated carbon, because of its highly absorbent qualities and the fact that it exerted a capillary action on the oil molecules was an excellent medium for removing this impurity. A mechanical mixer was necessary to prevent the carbon from floating on top or clinging to the sides of the tank. A medium sized filter capable of returning a good flow was all that was needed. The usual procedure was to filter in a separate tank, thereby freeing the plating tank of any undissolved salts or carbon. As carbon would clog the filter pads or cloths after prolonged use the oil molecules would elongate and be forced through the filter back into the solution. To prevent this, Mr. Bernick suggested that a pressure release valve should be built into the filter. This would indicate that cleaning was necessary.

He finished his talk by giving a practical demonstration of a modern filter and answering several filter problems brought up by the members.

RODERICK MCGHEE, *Secy.*

Chicago Branch held its 348th regular meeting April 12, at the Atlantic Hotel, with all officers present.

The applications of Edward Curran, and Glen Moore were read and referred to committees.

Letter from Milwaukee Branch boosting their Educational Session and Banquet on April 26th was read and filed.

Our June meeting was set ahead to June 21st.

E. G. Coffey spoke on the nickel metal situation, and after some discussion a resolution was passed that a committee be formed for immediate polling of members to determine how many workers will be directly affected

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seriously. This report is to be transmitted to our Supreme President to help him in his attempt to prevent our industry being given a serious setback. Whereupon our President, M. H. Longfield appointed J. W. Hanlon, R. J. Hazucha, H. R. Smallman, and O. E. Weickmann.

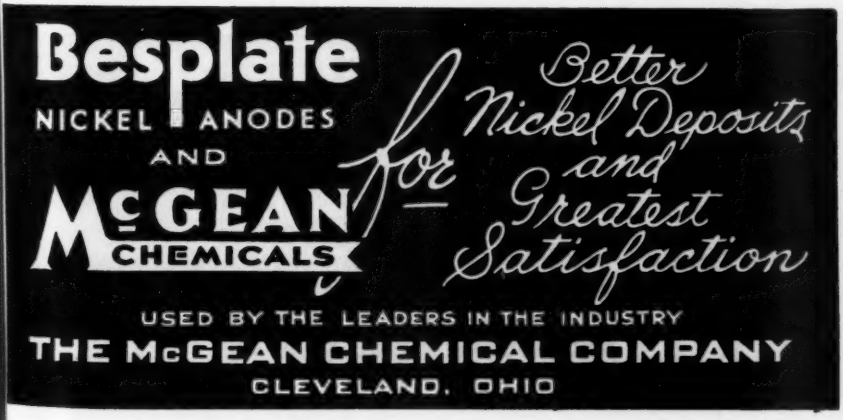
Our annual election produced the following results: president, C. Kelly, vice president, E. A. Lanz, secy.-treas., J. W. Hanlon, librarian, E. Woodmansee, board of managers, H. R. Smallman, M. H. Longfield, Fred Wahlen, delegates to 1941 Convention, J. W. Hanlon, M. H. Longfield, F. J. Hanlon; alternates, Frank K. Savage, W. J. Erskine, C. Kelly.

Mr. Ralph Paine of the General Electric Company, Bridgeport, Conn. gave an outline of the history of the Copper Oxide Rectifier. The many questions that were brought up and the effective manner in which he answered them to the complete satisfaction of the questioners earned for Mr. Paine a deserved hearty vote of thanks; and Chicago Branch suggests any other Branch desiring an interesting meeting attempt to secure Mr. Paine as speaker. E. A. LANZ, *Secy.*

Grand Rapids Branch held its meeting April 10 in the Wolverine Room of the Rowe Hotel. The meeting was started promptly at eight o'clock by our president, Mr. Maurice Caldwell. The minutes of the last meeting were read and approved and reports from committees given, Mr. Sperry gave a report on the display for the Convention to be held in Boston in June. Mr. Smith gave his report on the progress being made by the Grand Rapids Convention Bureau in behalf of our holding the National Convention in Grand Rapids in 1942. He also gave a report of this branch's increase in membership for the year and estimated we would receive third position. Our percentage of increase was about 23%.

The following officers were voted upon by ballot and elected for the following year: president, M. R. Caldwell; vice-president, Chester W. Smith; secretary-treasurer, C. E. Abel; librarian, L. B. Sperry; board of managers, F. D. Pace, Charles O. Werft, and Axel Rickson.

We had a substitute speaker for Dr. Ewing who was unable to come to Grand Rapids. Mr. Wiesman gave



an illustrated paper on "Removal of Impurities from Nickel Plating Solutions." Some discussion took place as to methods Mr. Wiesman used in his analytical work.

C. E. ABEL, *Secy.*

Binghamton-Syracuse Branch held its regular meeting April 25 at the Hotel Cortland, Cortland, N. Y. The meeting was called to order by our President Mr. George Simmons, at which time the following delegates to the convention were duly elected: Austin Fletcher, George Simmons, and Frank Hopkins. Alternates elected were William Mahar, Herbert Langenmeyer and William Langenmeyer. After all the Branch business had been transacted the meeting was opened to a roundtable discussion.

The next regular meeting will be held at Hotel Cortland May 23. This is the annual meeting with election of officers.

F. W. KENYON, *Secy.*

Boston Branch met May 1 at the Statler Hotel, Boston with President Jones in the chair.

Three letters were read, Buffalo, Cleveland and Grand Rapids asking the support of Boston Branch for 1942. One from our Supreme President on the future of metals for electro-deposition. Letters asking for the 1942 convention were turned over to the delegates to the convention.

Joe Barron says everything is ready now for the greatest convention ever held. All he asks is the cooperation of every member of the A.E.S.

Arthur Mintie hopes that all exhibits will arrive on time so that he may have everything ready when the convention opens on June ninth.

The committee on nominations presented a slate of officers and others were nominated from the floor. Election will take place June 19.

Delegates to the convention will be George Swift, Bert W. Sage, and Edward C. DeLorme. Alternates, Harold Nash, Robert Magnuson, and Howard Cramer.

Mr. Yates of the Chrom-Alum Company, Incorporated, being unable to be present because of the armament program sent his paper along, and it was read by Arthur J. Mintie. The paper was quite interesting and will be published in the REVIEW.

A. W. GARRETT, *Secy.*

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Toronto Branch. May 2. King Edward Hotel. President Archy Smith in the chair. The meeting opened with a fair attendance including Mr. Cecil Roberts and a number of platers from the Canada Skate Company of Kitchener, Ontario. They brought with them one application for membership with the promise of more.

The visitors were welcomed by Mr. Smith who ordered the regular routine to proceed.

The newly elected officers for the fiscal year were installed by Walter Barrows, the father of Toronto Branch. Each man got a lecture on what his duties were and when it came the turn of the membership secretary, Art Severs began to realize that he has a real job on his hands.

A question of nickel supply came up and John Acheson gave out all the information he had on the question. Insoluble anodes were discussed, also heavy deposits of copper to make up for standard specified thickness with light deposit of nickel and chrome. Chrome on copper came in for discussion with no definite solution to the problem. Bill Price submitted 6 samples of zinc die castings that looked as if they had been made with scrap material.

Archy Smith promised to have moving pictures for the June meeting which would be of interest to the platers.

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Toledo Branch held its annual meeting April 3. The meeting was called to order by President Miner at 8:30 P.M. Mr. Miner and Mr. Hunlock reported on the progress of the first annual Ohio educational session and banquet to be held in Cleveland May 10. The chair appointed the following members on the auditing committee: Mr. Joseph Di-Salle, Mr. Walter Weiker, and Mr. John Stegeman. Two applications were received for membership in the Toledo Branch. A motion by Mr. Weiker to repeal article one of the local by-laws, which reads that "the secretary shall be a member or delegate to the National Society, and his expenses to the convention shall be paid by the branch," was seconded by Mr. Shank and unanimously passed. A motion by Mr. Shank that the incoming secretary shall be paid $1.00 per member, per year salary, for services rendered, to take effect with the beginning of the new fiscal year, was seconded by Mr. Hale and passed unanimously.

Officers elected for the fiscal year 1941-42 are as follows: president, Chas. Vannorsdall; vice-president, S. C. Shank; secretary, Gaston Bergeman; treasurer, Ed. St-Arnaud; librarian, Harry Moser; board of managers, Walter Weiker, John Stegeman, and Paul Dressell. Mr. Miner declined the nomination for re-election to the office of president, due to the fact that business would not permit him to attend every meeting in the future. Mr. Miner was given a rising vote of thanks, for the splendid services rendered the branch in his capacity of president during the past two years, and was further complimented on the fact that he has been the most active president the branch has had for several years. A special meeting was called for April 14. GASTON BERGEMAN, *Secy.*

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Cleveland Branch met April 5. The officers, P. R. Lyons, president; Bill O'Berg, vice-president; Frank J. Opatrny, secretary-treasurer, and John A. Honnecker, librarian, were re-elected by acclamation. As the board of managers, Singler, Matts, and Peterjohn were elected by acclamation. Also Fred Matts, Bill Scott and Steen Thompson as delegates to the annual convention. Alternate Delegates:—Steve Miller, Bill O'Berg and Arthur Fullerton. These gentlemen were elected after a strenuous contest.

It was proposed that each delegate be allowed $75.00 for necessary expenses. This motion was put to a vote and passed, without contest or objections.

Mr. Joseph Singler reported that plans were under way for the Dayton, Cleveland and Toledo dinner meeting for May 10. Tickets will be $3.00 per

person. Also that the annual branch picnic will be held at Sunnybrook Gardens on July 19th. Tickets will be $1.00 or $1.25 per person.

Mr. Bernard Case of the Hanson-VanWinkle-Munning Company was then introduced by our Librarian, John A. Honnecker. Mr. Case gave an excellent summary of "Bright Nickel Deposits" enumerating the early difficulties, most of which have been solved. But he did not hold out any assurance for over-production of nickel itself.

However, the speaker pointed out that the natural search for substitutes will have an equal reaction for nickel and related coatings, when available. The superior advantages are numerous from a protective as well as decorative angle. The public has been educated to purchase and desire the plated finishes. The industry has endeavored to effect a continuous improvement in these finishes for the past quarter of a century and the standards obtained cannot be duplicated or equaled overnight by substitutes.

The speaker placed great importance on keeping the nickel solutions free of organic or other contaminations, and constructively offered a method of treating these contaminations, without shutting down the bath. He suggests pumping the solution into a storage tank and treating it with ½ to 1 ounce per gallon of activated carbon and activated Bentonite, with constant stirring, while holding the temperature of the solution between 150°-160° F. for two or three hours and then filtering the solution back into the plating tank.

Mr. Case was very fair in his summary of competitive solutions and pointed out the possible ill effects of poor control in any of them, his own Cobalt solution included. His address was well received and we hope to have the pleasure of having him as a guest speaker, again.

The Librarian announced that he has invited Dr. William Blum of the Bureau of Standards to address our May meeting. All members and interested friends are urged to attend this meeting.

FRANK J. OPATRNY, *Secy.*

Pittsburgh Branch held its last regular meeting this Spring May 1 at the University Club.

The present officers were re-elected for the ensuing year: Mr. S. E. Hedden, president; Mr. H. F. Saylor, vice-president; Mr. F. R. Keller, secretary-treasurer; Mr. M. A. Pederson, Mr. G. A. Jersey, and Mr. Glenn Herring, board of managers; Mr. R. A. Dimon, librarian.

The delegates and alternates for the convention are Messrs. Schmitt, Hedden and Keller as delegates and Huch, Saylor, and McLay as alternates.

Dr. Wm. Blum, our guest speaker, discussed "The Effect of the Present Shortage of Metals on the Plating Industry." Dr. Blum correlated the platers' position with that of the OPM

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and the Army and Navy on National Defense.

Dr. Blum revealed that 85% of the world's supply of nickel came from Canada and that United States receives about 85% of Canada's supply. There is no particular bottleneck in the manufacture of nickel for the equipment from mine to finished metal is on an equal footing for production ability. The present shortage of zinc is due to the lack of available equipment to produce the present demand, but there is no intrinsic shortage. Cadmium is a by-product of zinc and lead refining and its production is based on the production of these two metals. Chromium is imported at present but chromic oxide used for plating is obtained from low grade ores that are not suitable for alloy steels. There is an intrinsic shortage of tin since all the tin comes from Bolivia and the Straits of Malay. Steel, copper, lead, and silver are metals that we should expect to be available in normal quantities.

The following table shows the approximate percentage of total production of metals that is used in plating.

Copper	—	.01%
Zinc	—	1. %
Tin	—	1. %
Chromium	—	1. %
Nickel	—	7. %
Silver	—	10. %
Cadmium	—	50. %

Of the 1,000,000 pounds of nickel plated per month, about 62% is for the automobile trade.

The goal of the OPM in controlling the nickel is to provide for the following needs in the order shown: United States defense requirements, England's requirements, United States Government needs, and the Public's requirements. Arbitrarily the OPM has cut the allotment of nickel for plating to 50%.

The possible changes in nickel plating as suggested include plating from nickel salts with insoluble anodes, and substituting copper for part of the nickel thickness. If nickel is plated from its salts, insoluble anodes of carbon or lead are disintegrated by the presence of chlorine. Many of the

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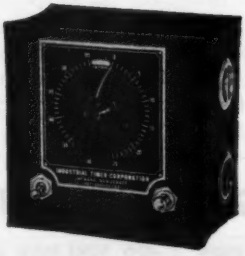

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addition agents used for bright nickel are oxidized by the chlorine and oxygen evolved at the insoluble anode. Nickel will have to be added in the form of nickel carbonate or nickel oxide since nickel sulphate would increase the acid concentration beyond the plating range. If copper is substituted for part of the thickness, the total thickness of nickel should be maintained at from .0002" to .0003" to prevent copper stains from bleeding through the nickel. Since there is a scarcity of Rochelle salts and sodium cyanide, acid copper has more chance of having available chemicals for continued plating than the various cyanide baths.

It is better to reduce the amount of plating done than to try to spread the present metal too far, for if a poor plating job is done it will be harder for the plating industry to make a comeback later on considering the competition of alloys and plastics.

FRANK R. KELLER, *Secy.*

Waterbury Branch held its April meeting on the 11th at the Hotel Elton. Twenty-one were present at the 6:30 P.M. dinner held in the Colonial Room and A. B. Crane won the free dinner. The Crane family is lucky!

President Candee opened the meeting at 8:00 P.M. Booklets furnished us by the Aluminum Company of America were distributed. They contain much information on the properties and finishing of aluminum, and are of decided value in anyone's library. A Buyer's Index published by the Pittsburgh Branch was also distributed.

W. L. Cassel reported continued progress on the exhibit for Boston. It would seem from the samples already collected that Waterbury will make a very excellent showing.

The meeting was turned over to Technical Chairman Arthur W. Tracy who introduced R. J. Green of the Alsop Engineering Company. Bob told us what was required in good filtration and the value of activated carbon in removing some types of impurities. He very neatly demonstrated the properties of activated carbon by removing the black from some very black ink.

George Dubpernell continuing with

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some of the more simple books reviewed "Things a Boy Can Do with Electrochemistry." This book is not quite so elementary as the title would indicate. It contains a very clear and understandable description of the various branches of electrochemistry including electroplating. Perhaps its main value is in the illustrations which are numerous and good.

The next speaker was Ellsworth Candee who pictured for us the mining, smelting and production of copper and the fabrication of non-ferrous alloys. His talk was well illustrated by a sound motion picture showing the process in detail.

S. L. HENN, *Secy.*

Practical plater, having had a great deal of experience in mechanical plating, as well as the control of solutions by chemical analysis, desires position in either production plant or job shop. Has handled Parkerizing and Bonderizing solutions. Now located in Chicago, but will settle elsewhere. Eight years experience. Write E. A. Lanz, Secy.-Treas., 284 Gage Road, Riverside, Ill.

Hartford Branch held a meeting at the Elks Club, Bristol, Conn., April 21. Gustaf Soderberg, Technical Director of the Udylite Company was the speaker of the evening. "Plating Room Control" was his subject.

The harmful effect of nitrates in Cadmium plating due to drag in from Nitric acid bright dip was emphasized as this forms ammonium hydroxide and lowers the cathode efficiency. The harmful effects of leaking heating coils was spoken of. Testing these coils by compressed air at intervals would prevent some of this trouble.

The loss by dragout in plating solutions can be lessened by installing drainage rods over the plating tank, using fine needle sprays over a portion of the plating tank (this will about replace evaporated water especially from heated solutions) and by the use of centrifuges for barrel plated parts. All of the above will more than pay for the extra equipment. In some instances redesigning of racks will aid in better drainage. Dragout losses can be accurately figured by the analysis of some inert material in the plating tank. As this does not enter into the reactions the analysis will give you the entire picture.

Accurate notes on rejections over a period of time will indicate trends in the plating room control. Perhaps purifying of plating solutions will be indicated, dumping of cleaning solutions will be needed or better rinsing facilities provided.

This was by far the best talk that we have had, for the plating foreman executive.

APLEY N. AUSTIN, *Secy.*

Newark Branch held its regular meeting on Friday evening April 18 in the Club Room of the Hotel Douglas, Newark, N. J. The meeting was called

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to order at 8:30 P.M. with President William T. Maguire presiding.

A communication from Buffalo Branch regarding the 1942 Convention and a communication from Los Angeles Branch with reference to adding amendments to the Constitution were read and voted to be turned over to the Delegates to the Boston Convention.

Mr. Philip Sievering, whom we were all glad to see at this meeting after a long illness, was called upon for a few remarks. Our Executive Secretary attended this meeting and told us of the activities of a number of branches he had visited this year. Mr. Leuchauer of the Dayton Branch also attended this meeting and was called upon for a few remarks. Mr. Paul Oldam once again asked the members for Convention Exhibits. He also announced that he was making arrangements for a visit to General Motors in Linden, N. J., some time in May.

The guest speaker for the evening was Mr. Gustaf Soderberg of the Udylite Corporation. His subject was "Cadmium Plating." Mr. Soderberg emphasized the fact that Cadmium Solution as well as other solutions are being wasted by the gallons in plating rooms. He suggested re-claim rinses, specially designed racks and other means for saving solutions. He also gave us many points on Plating Room Control and was asked many questions. One of the facts that was brought out during the discussion was the use of centrifugal force applied to baskets containing Cadmium plated parts. Mr. Louis Donroe stated that by this method his company was able to save anywhere from 6 to 10 gallons of cadmium solution per day.

GEORGE WAGNER, *Secy.*

Milwaukee Branch held its 319th regular meeting in the Colonial Room of Republican Hotel on May 2. Our retiring President, Jack Geissman opened the meeting. Suspending the regular order of business, we passed immediately to the installation of officers. Past Supreme President Ray M. Goodsell acted as Installing Officer.

President Rodney Olsen then conducted our regular meeting.

This is the first year in as long as this writer can remember when Milwaukee Branch has not had the pleasure of installing Dan Wittig in some capacity. Practically every year Dan would declare a closed season on himself, but the branch would manage to railroad him into some job. But he is still with us and will help in his usual manner.

Our new librarian paid well-deserved praise to the retiring librarian, Henry Bornitzke, and asked him to help this year. This Henry promised to do, and then Phil Ritzenthaler outlined his plans for the coming year. He made it plain that he was going to require the local members to contribute a little more to the Educational Sessions than they had heretofore.

Jim Poulson, who has done an excellent job on the membership committee this past year, has been elected as the junior member of the Board of Managers, and also appointed by the President to continue on the membership committee.

As usual, Milwaukee Branch's annual Educational Session and Banquet at the Hotel Schroeder on April 26 was an unqualified success. At least 200 were present in the Green Room in the afternoon to hear papers by William Geissman of Briggs and Stratton Corporation, Milwaukee, whose paper was entitled "The Chemical Engineer and Electroplating." Mr. R. F. McGuire of Donald Sales and Manufacturing Company, Milwaukee, spoke on

"Cadmium Plating for Defense Work." Both of these papers were excellent.

At the suggestion of Mr. Vincent Mattacotti of Hanson-VanWinkle-Munning Company to our chairman of the Educational Committee, the next paper, if we may call it that, was an innovation. It was a regular round table discussion. Mr. Walter Pinner spoke briefly on nickel, Mr. Philip Ritzenthaler on chromium, Mr. Joseph Niles on gold and silver, and Mr. McGuire on cadmium and zinc. No questions were permitted until all had spoken, and then the whole meeting was thrown open for any and all questions. The gist of the whole thing was to get first-hand information, right up to the minute, on the effect of the defense program and the shortage of certain metals on the plating industry.

Throughout the whole meeting the chairman, Mr. Vincent Sheehan, displayed his usual tact and finesse in maintaining a high degree of interest and attention.

In the evening, we all gathered in the Crystal Ball Room for the Banquet and Entertainment. The show was produced and staged by our President Rodney Olsen, and the entertainers were all polishers, platers, and sons and daughters of polishers and platers, and as anyone who saw it can testify, it was really a swell show.

Music for dancing was furnished by Betty's Play Girls, and must have been good, if one may judge by the way the crowd stayed. We'll see you next year.

DEXTER F. RHODES, *Secy.*

Indianapolis Branch opened its March 5 meeting with a record attendance of some seventy-two members and guests. One of our most distinguished visitors was Dr. Frank C. Mathers, head of the Chemistry Department of Indiana University and the present president of the American Electro-Chemical Society, who attended with seven of his graduate students.

Our guest speaker was Mr. George Hogaboom of the Hanson-VanWinkle-Munning Company, who is the present vice-president of the American Electro-Chemical Society. Five of our members attended the Anderson branch meeting on the evening previous also to hear Mr. Hogaboom speak on the topic, "Information Please."

Mr. Hogaboom's subject before the Indianapolis Branch was "Bright Nickel Plating." He introduced his lecture with a discussion of the present age as one of high current densities even to such extents as 1000-1500 amperes per square foot.

The development of the Cobalt Bright Nickel Bath started with a Cobalt content of 18%, but cost of the cobalt forced such a bath almost out of existence. The content was reduced to 1% giving a semi-bright deposit, and was then raised to 5% to bring the results again into the bright range. The content of the present day bath was given as follows:

Nickel Sulphate.....	24 oz./gal.
Nickel Chloride.....	4 " / "
Cobalt Sulphate.....	0.5 " / "
Boric Acid.....	4.0 " / "
Ammonium Sulphate	0.1 " / "
Formaldehyde.....	0.33 " / "
Nickel Formate.....	6.0 " / "
pH.....	4.1

Temperature—

160F at 40-60 amps sq. ft.

At lower current densities such as fifteen amps. sq. ft. a lower temperature can be used as 70-80 F which gives a brush finish.

A discussion arose as to the importance of the pH of a bath, and the speaker's answer was that the results were very different often resulting in

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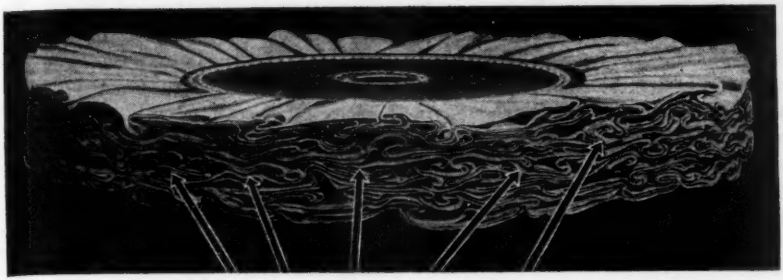

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bad adhesion when the pH at the cathode was higher than in the bath. Such bad adhesion was caused by the formation of iron, nickel, and copper hydrate. The anode and cathode current densities and the anode and cathode ratio must often be checked for the best results. Voltage pressure was also discussed as it often exceeded the decomposition voltage of sulphuric acid.

At the April second meeting, the branch librarian, Mr. David Ross, introduced our guest speaker, Dr. D. A. Cotton, chief chemist of the processing laboratory for Delco-Remy in Anderson, Ind., and a man who has helped solve many problems for others in the plating field.

The speaker's subject was "Chromium Plating" not in the production line itself but rather as a side activity to aid production.

Although chromium was first deposited from its trivalent state in 1853, Bunsen received credit for the first deposit of the metal in 1854. With the addition of a little sulphuric acid the bath gave even better results, and then Sargent attempted to use chromium sulphate in the place of the sulphuric acid. This idea proved to be successful but since it was so important to maintain a definite ratio between the chromic acid and the chromium sulphate, the use of sulphuric acid came back almost universally. The deposition of chromium from its hexavalent form, it was said, was almost completely forgotten for two good reasons; first, the yield is low for the power output, and second, the temperature and current density must be watched so closely in order to get a good deposit.

Dr. Cotton explained the use of a good chromium deposit to reclaim plug gauges, ring gauges, drills, molds, taps which are worn away quickly in plastic work, reamers, and even files to be used on tool steel. For all inside work the process developed inside anodes the same shape as the piece so as to insure a smooth deposit. The technique was greatly improved as to current density, cleaning operations, masking and stripping of rejected parts. At the present time the current density runs as high as three hundred to one thousand amps. per sq. ft. No preliminary cleaning operations are now required other than degreasing with the exception of a fifteen to twenty second reverse current clean. The bath contains from forty to forty-five ounces per gallon with an approximate ratio of 70 to 1 sulphuric acid. The temperature is maintained at 135° to 140° F. This bath is a very flexible one and can be used in all kinds of emergency work even to plating 400 to 900 lb. rams for hydraulic presses.

The speaker showed a saving of 16 to 17 thousand dollars in tools per year, not counting the regular shut down losses in production, and thought that others ought to have the same saving in their plants.

LELAND E. BASS, *Secy.*

Newark Branch. The May 2 meeting was called to order at 8:30 P.M. with President William T. Maguire presiding. John V. Lavery was elected to Active Membership; Robert Doherty, William J. Coleman, William Strobach, Corado Corsini and Hazzard F. Peters were elected to Associate Membership.

Mr. Horace H. Smith reported that the Educational Session and Banquet were a huge success both financially and socially and that a final report would be made at the next meeting.

Mr. Paul A. Oldam set May 16 as the final date for exhibits for the National Convention. He emphasized

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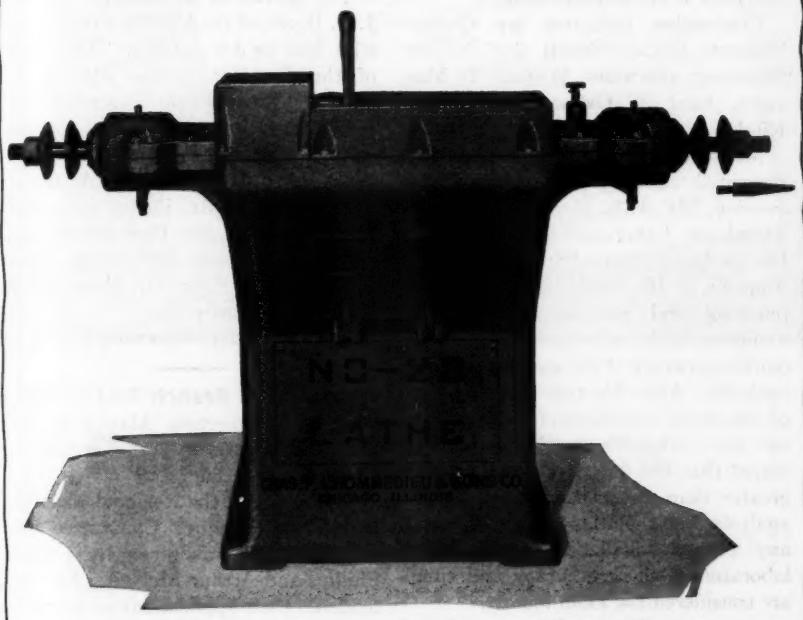

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the fact that all exhibits should be in his hands on or before that date in order to enable him to prepare a Panel Board and make shipments to Boston. He next stated that he had received a letter from General Motors in Linden, N. J. inviting us as a group to visit their plant June 3. He asked the Secretary to notify the members and their wives to that effect.

Convention delegates are George Wagner, Horace Smith and Nelson Sievering; alternates, William T. Maguire, Paul A. Oldam and George Klink.

Mr. Oldam, acting librarian, next presented, as the guest speaker of the evening, Mr. A. E. Ruehle of the Bell Telephone Laboratories, New York. His subject was "Spectrochemical Analysis." His talk was very interesting and was accompanied by numerous slides on which he brought out the accuracy of the spectrochemical analysis. After his talk the question of cost for an installation for this analysis was brought up. Mr. Ruehle stated that the initial cost was by far greater than any other apparatus for analysis, but that this did not present any obstacle in larger concerns or laboratories where accuracy and time are considered the main factors.

GEORGE WAGNER, *Secy.*

Cincinnati Branch held its regular monthly meeting April 24, Vice-President Harry Misner, presiding. A letter was read from Mr. Owen Towner, resigning the chairmanship of the Membership and Exhibits Committees, because he had accepted a position in another city. The resignation was accepted with regret.

Harry Misner consented to accept the Membership and Exhibits Committee Chairmanships and set a fine example by displaying at the meeting a number of boards made up by him for the forthcoming convention. It was suggested at the meeting that those members who have not given their place of employment and the type of work specialized in to the Secretary, be approached so that this list can be completed and be made available to the members.

The speaker of the evening was Mr. J. C. Bogle, of the Udylite Corporation who had as his subject, "The Place of the Rectifier in the Plating Industry." Mr. Bogle described the possibilities and limitations of the rectifier and was subjected to much questioning after his talk. An added attraction was Mr. Pichel, of a local Cigar Company, who blew smoke rings. The exhibition was enjoyed by everyone as were the cigars Mr. Pichel passed around afterwards.

MARTIN GANNON, JR., *Secy.*

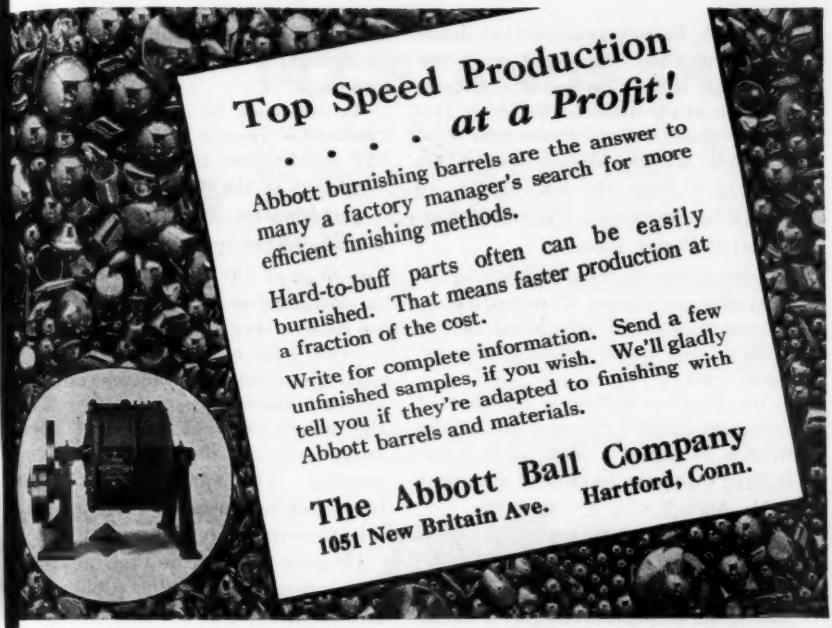
Bridgeport Branch held its regular monthly meeting May 1 at the Stratfield Hotel with President John E. Charleson presiding.

The report of the Regional Meeting, Hotel and Banquet Committee was complete and was given by Eugene Phillips and Arthur McNeil. Six men tendered their applications as members to the Society.

Delegates elected to the National Convention to be held in Boston, Mass. in June, 1941 are as follows: Delegates, Raymond J. O'Connor, Joseph G. Sterling, John E. Charleson; Alternates, Clarence C. Helmle, George Wagstoff, and Wm. A. Ehrencrona.

A motion was made and passed that the registration fees to the convention are to be paid by the branch to all the officers and delegates who attend the convention in Boston.

Letters from the Grand Rapids, Mich., Cleveland, Ohio and the Buffalo,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New York, Branches express their desire to entertain the National Convention in 1942. The Bridgeport Branch voted to let the delegates decide on this matter at the Convention in June.

Orville Waring Mellick sent in his resignation from the Society due to service in the Navy. He is now stationed at Puerto Rico.

A discussion on the possibility of entertaining a future National Convention was held. It was decided to bring up this matter at our next meeting in June.

Mr. Thomas Wilber of the Bullard Company invited the members of the Branch to attend a plant visit to the Bullard Company to be held Saturday, A.M., May 3.

President Charleson turned the meeting over to our Librarian, C. C. Helmle. There was a good discussion on various plating problems including new activities now encountered by the plating industry due to shortage of various materials now greatly used for defense measures.

JOSEPH G. STERLING, *Secy.*

Cleveland Branch met May 3. The meeting was called to order promptly at 8:30 by President P. R. Lyons.

Under reports of committees Mr. Singler made request for some activity on the exhibits. Said that transportation would be paid for return of all exhibits sent from Cleveland.

Report was made by Mr. Singler on the approaching meeting of the Dayton, Toledo and Cleveland Branches and urged a large attendance.

The Platers Picnic is to be held on July 19th at Sunnybrook Gardens.

Due to the convention in June it was ruled that the June meeting be held on June 28th at which time the reports of the delegates would be received and there would be no speaker that night. There will be no July meeting.

In reference to the letter of the Milwaukee Branch on amendments to the constitution this was left to the discretion of the delegates.

Our librarian, Mr. Honnecker, then introduced the speaker of the evening, Dr. Blum of the Bureau of Standards at Washington. Dr. Blum covered his subject very thoroughly and it was received by a very attentive audience.

He discussed the problems confronting the platers and quoted figures on the quantities of various metals used in the past and their vast increase in demand. This was in the process of being met but in many cases it would take time to satisfy these demands.

He gave us a picture that impressed the seriousness of the problem of defense and urged the cooperation of the Platers.

A very interesting question and answer period followed.

FRANK J. OPATRNY, *Secy.*

St. Louis Branch held its regular meeting Friday May 4. Dinner was served to 12 members.

Letters were read from the different branches in regard to the 1942 convention and changes in the By-Laws. Any change was left up to the delegates elected.

Elected officers for the coming year are as follows: F. Horath, president; E. Guyott, vice-president; C. T. McGinley, secy-treas.; J. Vogt, librarian. Delegates to convention: L. Hoffmister, J. Humbrecht, and C. T. McGinley; Alternates to convention: A. Barth, H. Lubker, and J. Vogt. Board of managers: H. H. Williams, J. Humbrecht, and B. Daw.

CHAS. T. MCGINLEY, *Secy.*

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THE QUESTION BOX

Los Angeles Branch

Q. What is a good formula for an iron plating solution?

A. Refer to pages 37-38 of the 1940 Platers Guidebook.

Q. My cadmium solution is very dark, like strong coffee. Anodes are coated with a black scum. How can scum be removed and prevented from forming?

A. Solution is too concentrated.

Q. Cadmium solution contains 3 oz. Cd and 6 oz. Cn per gal. Is this satisfactory for barrel plating?

A. Increase Cn to 10 oz. and NaOH to 1 oz. per gal.

Q. A 10% solution is being used to remove fire scale after annealing after which work is run through Cn solution, 6 oz. per gal. with reverse current but black smut remains on the work. How can this be removed?

A. Increase Cn to 9 oz. per gal. Tumble in sawdust.

Q. Silver anodes are crystalized in plating solution. How can this be eliminated?

A. Add calcium sulphate, cool solution and filter.

ERVIN FRAUENHOFF, *Secy.*

Chicago Branch

Q. Will colors fade from a hypo sugar of lead solution?

A. Must be lacquered, then will hold for many months.

E. A. LANZ, *Secy.*

Detroit Branch

(NOTE: The first four questions refer to Dr. Faust's paper on the electrodeposition of alloys and were answered by him.)

Q. 1(a) What type of solution is recommended for the deposition of nickel-zinc alloys?

(b) Can alloys of lead and tin be electrodeposited, and what type of solution is used?

A. 1(a) As far as is known, the electrodeposition of nickel-zinc alloys is at present a laboratory curiosity. Using a cyanide solution, the current efficiency is very low. A patent has been issued on the deposition of these alloys, but as far as is known the process is not used commercially.

A. 1(b) Lead-tin alloys have been produced commercially as described by Blum. Fluoborate solutions are used and the anodes are a lead-tin alloy containing somewhat less tin than is desired in the deposits. The cathode efficiency of this solution over a wide range of conditions is nearly 100%.

Q. 2. What comments can be made on the characteristics of electrodeposited speculum (80% copper-20% tin)?

A. 2. This alloy can be deposited at high current efficiency using an alloy anode. Under proper conditions, the anodes are bright and corrode uniformly. The solution is quite stable.

Q. 3. How does the tensile strength of electrodeposited 3% lead-97% silver alloy compare with that of the same alloy cast in the usual manner?

A. 3. No tensile strength measurements were available. The fatigue strength was thought to be much more important and this factor was much higher for the electrodeposited alloy

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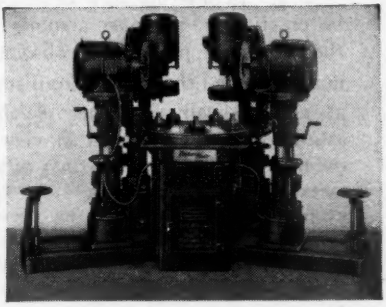

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than for the cast alloy. Theoretically, the tensile strength of the electrodeposited alloy will be superior because of the absence of lead from the grain boundaries.

Q. 4. What is the patent situation on the white-bronze process described by the speaker?

A. 4. The work on this white-bronze deposit has been done at the Battelle Memorial Institute. There is a pooling of patents of the International Tin Research Council and the City Auto Stamping Company of Toledo. It is anticipated that the latter will market the process.

Q. 5. In view of the shortage of nickel anodes, could a copper anode covered with a thin coating of platinum be substituted? It must be assumed that the pH of the nickel solution can be kept reasonably constant. Chlorine will of course be liberated at such an anode. The initial cost of such anode would be high, but the anode would not be consumed.

A. 5. In order for such an anode to be practicable, we must assume that the deposit of platinum is absolutely nonporous and that it will not dissolve at all anodically. Neither of these assumptions seems correct in view of the fact that very thin coatings of any metal are usually porous and also keeping in mind that in the present type of nickel solutions containing chlorides, the platinum would probably corrode anodically to a certain extent. As soon as any copper became exposed, we would no longer have a platinum anode, but a copper anode which would definitely be unsatisfactory in a nickel plating solution. Some work using platinum anodes has been done by the International Nickel Company and information regarding this can undoubtedly be obtained by writing to Dr. Wesley of that company.

Q. 6. What treatment of plastic parts is required to prepare them for chromium plating?

A. 6. Several companies have advertised or described processes for plating on nonmetallic objects such as plastics and rubber. Among them are the Metaplast Corporation, the Atchison Graphite Company, and the Special Chemicals Company.

The basic problem seems to be to get an initial conductive coating on the surface of the nonmetallic object. Roughening the surfaces by sand blasting is said to aid in anchoring this initial coating, but increases the amount of buffing necessary to obtain a smooth finish after the electrodeposited coating has been applied. A silver coating can be deposited on nonmetallic objects the same way that it is deposited on the back of a mirror, that is, by chemical reduction. The Dunlop Rubber Company has brought out a rubber which is said to be conductive. One rather unusual approach to this problem is to mold the article inside a very thin metal foil which is inserted in the molds before the plastic material enters the mold. When removed from the molds, this metal foil is the outer surface of the article and presents a good basis for electrodeposits. As far as is known, plastics are not being electroplated on a large scale.

R. B. SALTONSTALL, *Librarian.*

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Membership Report

ELLSWORTH T. CANDEE, *Chairman, Membership Committee*

To May 1, 1941

ELECTIONS

Binghamton-Syracuse Branch

Irving A. Psyck, 608 Helen St., Syracuse, N. Y. Associate

Boston Branch

William B. Harvey, 6 Becket Street, N. Quincy, Mass.
Robert A. Canning, 7 Madeline Ave., Worcester, Mass. Associate
Louis Epstein, 138 Washington St., Quincy, Mass. Associate
Edmund J. Quinlan, 6 Olive St., Nashua, N. H. Active

Chicago Branch

Clarence A. Falk, 2101 Canalport Ave., Chicago, Ill. Associate
Henry Lipsey, 741 E. 80th St., Chicago, Ill. Active
William Madaus, 8018 Eberhart Ave., Chicago, Ill. Associate

Cincinnati Branch

William Hirn, 2337 Indian Md. Ave., Norwood, O. Associate
Earl Robbins, 607 S. 4th St., Hamilton, O. Active
Joseph T. Ryan, 2156 Cathedral Ave., Norwood, O. Associate

Dayton Branch

Charles Brown, 633 N. Elizabeth St., Lima, Ohio. Active
Austin Bentley, 509 Markinson Ave., Columbus, Ohio. Associate

Detroit Branch

Geo. Paul Hogg, Industrial Lubricants, 5736 12th, Detroit, Mich. Associate
Hamnett P. Munger, 2313 E. Noble Ave., Monroe, Mich. Active
Kenneth W. Rule, 32 North Drive, Decatur, Ill. Active

Grand Rapids Branch

Keith E. Yhouse, 1226 Jefferson, S. E., Grand Rapids, Mich. Associate
Laurence Cornelius, Jr., % Wolverine Brass Works, Grand Rapids, Mich. Associate
Otis O. Kuhlman, 433 Woodlawn, S. E., Grand Rapids, Mich. Associate
Joseph M. Haviland, 15 Putnam, S. W., Grand Rapids, Mich. Active
Roger Slate, % Michigan Bumper Corp., 740 Ann St., N. W., Grand Rapids, Mich. Active

Hartford Branch

Harold G. Austin, 117 Hull St., Bristol, Conn. Active
J. R. Denton, 1791 Asylum Ave., West Hartford, Conn. Associate
Rolan J. Frechette, 53 Cypress St., Bristol, Conn. Associate
Frank J. Wall, P. O. Box 134, Forestville, Conn. Associate
Edwin Charles Crandall, 282 Arch St., New Britain, Conn. Associate
George Eben Vibberts, Jr., 1895 Broad St., Hartford, Conn. Associate

Los Angeles Branch

Orlando T. Kott, 803 W. 76th St., Los Angeles, Cal. Associate
W. L. Dolan, 728 E. 59th St., Los Angeles, Cal. Associate
Dennis Friedland, 1016 N. Sycamore, Los Angeles, Cal. Associate
W. R. Schuler, 3358 Canfield Ave., Los Angeles, Cal. Active

Milwaukee Branch

Bernard T. Calhoun, 510 New York Ave., Sheboygan, Wis. Active
William E. McIntosh, 606 W. Wisconsin Ave., Milwaukee, Wis. Associate

Newark Branch

Kenneth G. Compton, 285 Cathedral Ave., Madison, N. J. Associate
Myron Bradford Diggin, 21 Weldon Rd., Matawan, N. J. Associate
Thomas H. Schlipf, Third Street, Pequannock, N. J. Active

MEMBERSHIP REPORT MAY 1st, 1941

BRANCH	May 1, 1940	Change in Membership	Percent Change
1 Los Angeles	59	+60	+101.7
2 San Francisco	20	+18	+90.0
3 Lancaster	25	+17½	+70.0
4 Grand Rapids	52	+25	+48.1
5 Waterbury	66	+21½	+32 6
6 Springfield	51	+16½	+32.4
7 Cincinnati	41	+16½	+28.1
8 Dayton	62	+16½	+26.6
9 Montreal	23	+6	+26.1
10 Boston	80	+20½	+25.6
11 Pittsburgh	34	+8½	+25.0
12 Rochester	62	+13½	+21.7
13 Cleveland	70	+14½	+20.9
14 New York	102	+19	+18.6
15 Toledo	40	+6	+15.0
16 Philadelphia	133	+18½	+13.9
17 Milwaukee	84	+8	+9.5
18 Hartford	45	+4	+8.9
19 Newark	125	+10½	+8.0
20 Anderson	38	+3	+7.9
21 Detroit	250	+9	+3.6
22 Chicago	225	+7½	+3.3
23 St. Louis	77	+2	+2 6
24 Bing.-Syracuse	22	+½	+2.3
25 Bridgeport	71	+½	+0.7
26 Prov.-Attleboro	38	—½	—1.3
27 Toronto	67	—1½	—2.2
28 New Haven	119	—13	—10.8
29 Baltimore-Wash.	49	—5½	—11.2
30 Buffalo	57	—12	—21.1

MEMBERSHIP — May 1st, 1940 = 2187
MEMBERSHIP — April 1st, 1941 = 2525
GAIN IN MEMBERSHIP 338
GAIN = 15.4%

NOTE: Honorary members are included with each Branch.

Newark Branch (Cont.)

Robert Doherty, 79 3rd St., Clifton, N. J. Associate
William J. Coleman, 78 Fenner Ave., Clifton, N. J. Associate
Corado Corsini, 99 Kentucky Ave., Paterson, N. J. Associate
John V. Lavery, 538 Summer Ave., Newark, N. J. Active
Hazzard F. Peters, Curtiss Wright Corp., Caldwell, N. J. Associate
William Strobach, % The S. S. White Dental Mfg. Co., Princes Bay, S. I., N. Y. Associate

New Haven Branch

Reuben W. Gordon, 17 Shelborne Road, Stamford, Conn. Associate
Isadore Himmel, Himmel Bros. Co., 1409 Dixwell Ave., Hamden, Conn. Active
Murray Himmel, Himmel Bros. Co., 1409 Dixwell Ave., Hamden, Conn. Active

New York Branch

Abraham Cantor, 753 Howard Ave., Brooklyn, N. Y. Active
Ralph Piriano, 646 E. 182nd St., Bronx, N. Y. Active
Joseph F. Brust, 119 Walton St., Brooklyn, N. Y. Associate
Alexander M. Kohn, 2186 E. 19th St., Brooklyn, N. Y. Active
Leonard A. Kornblum, 325 E. 59th St., Brooklyn, N. Y. Associate
Stewart Varn, Kuehne Chemical Co., Elizabeth, N. J. Associate
Michael Yacco, 243 Laurel Place, E. Rutherford, N. J. Active
Joseph Lupo, Jr., 4510 Bullard Ave., Bronx, N. Y. Active

Philadelphia Branch

Carleton C. Kimber, 2512 Carman St., Camden, N. J. Associate
John A. Cairns, 2232 S. Bonaffon St., Philadelphia, Pa. Associate
William J. Weder, Jr., 33 Fairfield Rd., Upper Darby, Pa. Associate
Thomas J. Connor, 136 N. Elm Ave., Aldan, Del. Co., Pa. Associate

Pittsburgh Branch

Damon C. Antel, 742 Fifth Ave., Coraopolis, Pa. Associate
A. B. Davenport, Jr., Vandergrift Bldg., Pittsburgh, Pa. Associate
Richard Rimbach, 1117 Wolfendale St., Pittsburgh, Pa. Associate
Wm. A. Rogers, 721 Highland Bldg., Pittsburgh, Pa. Associate
Lawrence A. Reisman, 2035 Fifth Ave., Pittsburgh, Pa. Associate
Edward W. Hopper, 973 Ohio Ave., Midland, Pa. Active

Rochester Branch

William J. Conley, University of Rochester, River Campus, Rochester, N.Y. Associate

San Francisco Branch

Eldo M. Alexander, 4907 Congress Ave., Oakland, Cal. Active
Arthur Kistler, % L. H. Butcher Co., 157 Vermont St., San Francisco, Calif. Associate
J. R. Pattenger, 170 Division St., San Francisco, Calif. Associate
Fred B. Shear, 2350 Washington Ave., San Leandro, Calif. Active
Ray Whittern, 232 Homer Ave., Palo Alto, Calif. Active
John Ulrich, 1425 9th Ave., Oakland, Cal. Active
P. Guerich, 1132 East 12th St., Oakland, Cal. Active
Farnsworth Currier, 527 East 8th St., Oakland, Cal. Associate
Hugh Morgan, 268 First St., San Francisco, Cal. Active
Rudolph Barda, 575-3 St., Richmond, Cal. Active
Samuel Herrick, 755 Vestal Ave., San Jose, Cal. Active
Raymond L. Sorrells, 6003 Avenal Ave., Oakland, Cal. Active
Kenneth Reavis, 509A West Merle Ct., San Leandro, Cal. Associate
Wesley Plunkett, 2350 Washington Ave., San Leandro, Cal. Associate
C. T. Henshall, Jr., 1400 16th St., San Francisco, Cal. Associate

St. Louis Branch

Henry E. Schier, 4222 Lafayette Ave., St. Louis, Mo.
Alexander R. Eichloff, 5309 Walada Ave., St. Louis, Mo.
N. S. Knierim, 3825a Humphrey Ave., St. Louis, Mo.

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D A R C O
CORPORATION
60 East 42nd St.
New York, N.Y.

Toronto Branch

A. C. West, 353 Indian Grove, Toronto, Ont. Associate
J. J. Fitzsimmons, 152 Glenmount Park Rd., Toronto, Ont. Associate
S. Whittaker, 40 Goldwin Ave., Mt. Dennis, Ont. Associate

Waterbury Branch

Richard W. Goss, % Scovill Mfg. Co., Waterbury, Conn. Associate
Isidore Himmel, 1409 Dixwell Ave., Hamden, Conn. Associate
E. A. Sesselman, 50 Tracy Ave., Waterbury, Conn. Associate
William Macristy, Maple Hill Ave., New Britain, Conn. Associate
Edwin A. Maker, % Benrus Mfg. Co., Cherry Ave., Waterbury, Conn. Active
Edmund C. Knill, 176 Winthrop St., New Britain, Conn. Associate
Frederick W. Swalwell, Reynolds Bridge, Thomaston, Conn. Active
Willis H. Yarnall, Benrus Mfg. Co., Waterbury, Conn. Associate

APPLICATIONS

Baltimore-Washington Branch

Harry F. Borleis, 316 N. Holliday St., Baltimore, Md. Active

Bridgeport Branch

Anthony John Chenis, Bullard Co., Bridgeport, Conn. Associate
Joseph G. Coppola, 19 Central St., Belltown, Stamford, Conn. Associate
Samuel Gordon, 4 Delaware St., Norwalk, Conn. Active
Charles Nagot, 16 Harrison Ave., New Canaan, Conn. Active
Andrew Pochna, 31 Hill St., Stamford, Conn. Associate
Robert R. Sherwood, Hope St., Springdale, Conn. Active

Buffalo Branch

James C. Mays, The Carborundum Co., Niagara Falls, N. Y. Associate

Chicago Branch

Edward Curran, 1507 N. Kedvale Ave., Chicago, Ill. Active
Glen Moore, 314 Cloud St., Michigan City, Ind. Active

Cleveland Branch

Wm. V. White, 13617 Kelso Ave., Cleveland, Ohio. Active
K. H. Piepenberg, 1416 Olivewood Ave., Lakewood, Ohio. Associate
Oscar W. Kuntz, 4836 East 85th St., Cleveland, Ohio. Active

Detroit Branch

James Boyd, 1028 Waterman, Detroit, Mich. Active
Richard Flanigan, Bruce Products, 5712 12th St., Detroit, Mich. Associate
Edward Pilkarski, 5857 Trenton St., Detroit, Mich. Associate
Joe R. Wagner, 1249 Holden, Detroit, Mich. Active

Hartford Branch

Gabriel Giamattasio, 56 French St., Torrington, Conn.

Indianapolis Branch

Thomas O. Evans, 1723 Pennsylvania St., Columbus, Ind. Active

New York Branch

Jesse H. Levine, Halcolite Co., Brooklyn, N. Y. Associate
Jule F. Davis, Special Chemicals Co., New York, N. Y. Associate
George Fusco, W. L. Maxon Corp., New York, N. Y. Associate
Irving Goldwasser, Aaron Plating Corp., New York, N. Y. Active

REINSTATEMENTS

John B. Figli, 2129 85th St., Brooklyn, N. Y. Active, New York Branch
Gustav Mallow, 8 Featherbed Lane, Bronx, N. Y. Active, New York Branch

SUSPENSIONS

Thos. A. Beard, Cincinnati Branch
R. E. Reagon, Cincinnati Branch
Walter Charlton, Detroit Branch
Samuel Douglas, Detroit Branch
Martin Edinger, Detroit Branch